

VOL. XXVII. No. 2

FEBRUARY 1942

MECCANO

MAGAZINE



THE STEEL-WORKER

6^d

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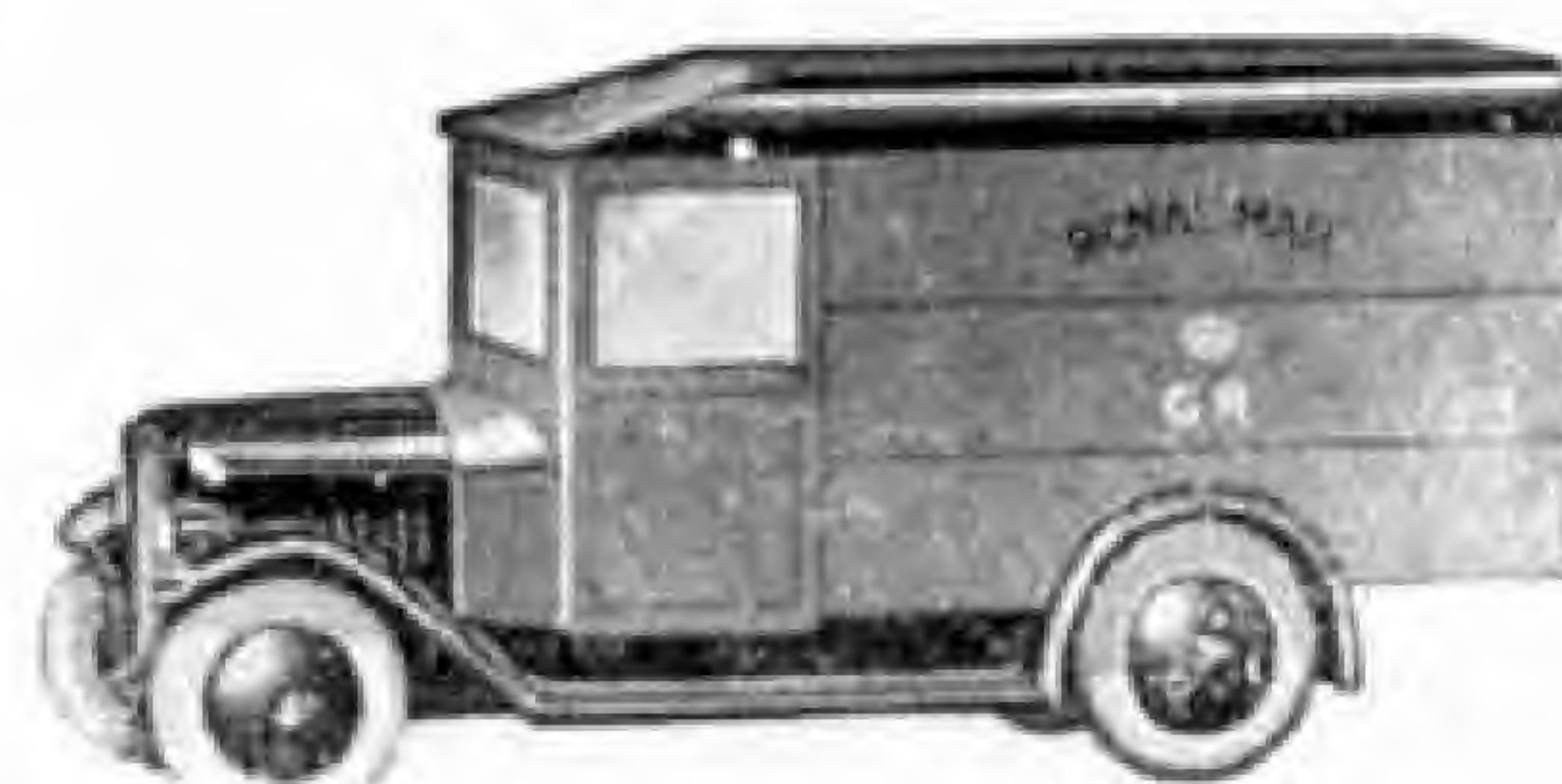
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SPECIAL NOTICE

Will readers of the "Meccano Magazine" please note that, due to pressure of other work, we have been compelled temporarily to discontinue our Repairs Department, and no further work of this kind can be accepted.

When we are able to resume work in our Repairs Department we will at once make an announcement in the "M.M." and to our dealers.

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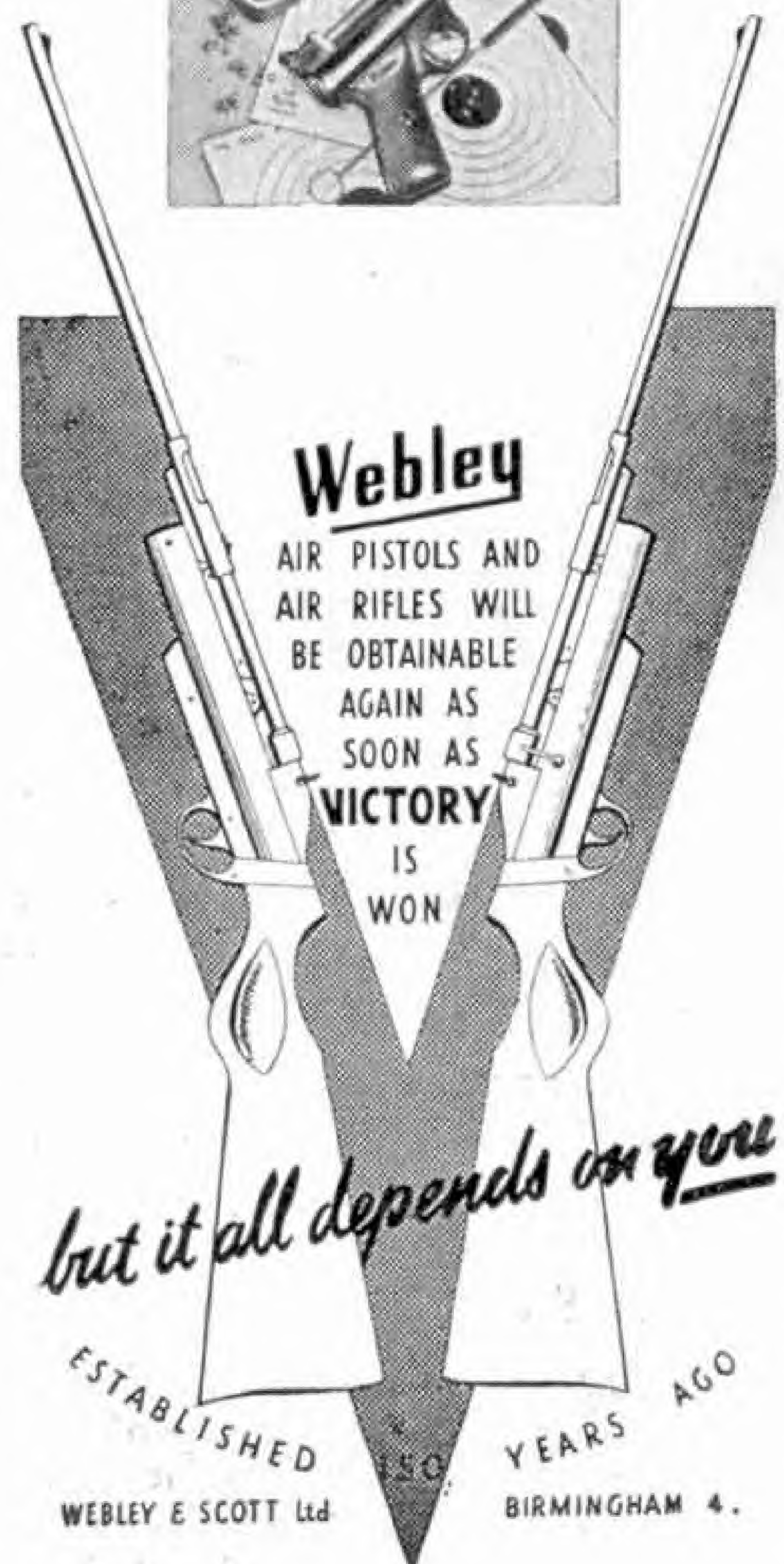
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There is little doubt that the first man to fit pedals to a bicycle was Kirkpatrick MacMillan, a blacksmith of Courthill, Keir, Dumfriesshire, round about 1840. MacMillan drove his rear wheel by cranks and swinging levers, and steered his front wheel by direct sloping forks. No doubt the method of propulsion was to start by the old hobby-horse method of striking each foot in turn on the ground. MacMillan paid the penalty which inevitably attaches to the pioneer. In the course of his experiments he mounted the footpath, thereby knocking down a child, and was fined 5/- at Gorbals Police Court, Glasgow, on June 8th, 1842.

THE BIRTHPLACE OF THE DUNLOP TYRE

This plaque marks the house at 26 May Street, Belfast, where in 1887-8 John Boyd DUNLOP carried out experiments which led to his epoch-making invention of the first practicable pneumatic tyre, thereby revolutionising road mechanical transport.





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MECCANO

MAGAZINE

Editorial Office:
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February 1942

With the Editor

President Roosevelt

This month I publish a portrait of President Roosevelt, the great American who is so gloriously leading his country in its gigantic war effort. During the past few years Mr. Roosevelt has grown steadily higher in the estimation of the British Empire. From the earliest days of the war he recognised its seriousness, and he has striven unceasingly to rouse his country to the realisation of the danger. By his famous Lend-Lease Bill and in other ways he has helped Britain in her darkest days; and now that the United States is in the war with us we place him alongside our own Winston Churchill in an Allied leadership that will lead to certain victory.

Franklin D. Roosevelt was born in New York in 1882 and was educated at Harvard University. Later he graduated in law at Columbia University and subsequently practised as a lawyer in New York. About this time he became keenly interested in politics on the Democratic side. In 1913 President Wilson appointed him Assistant Secretary of the Navy and he held this post until 1920. During the War of 1914-18 he helped greatly in

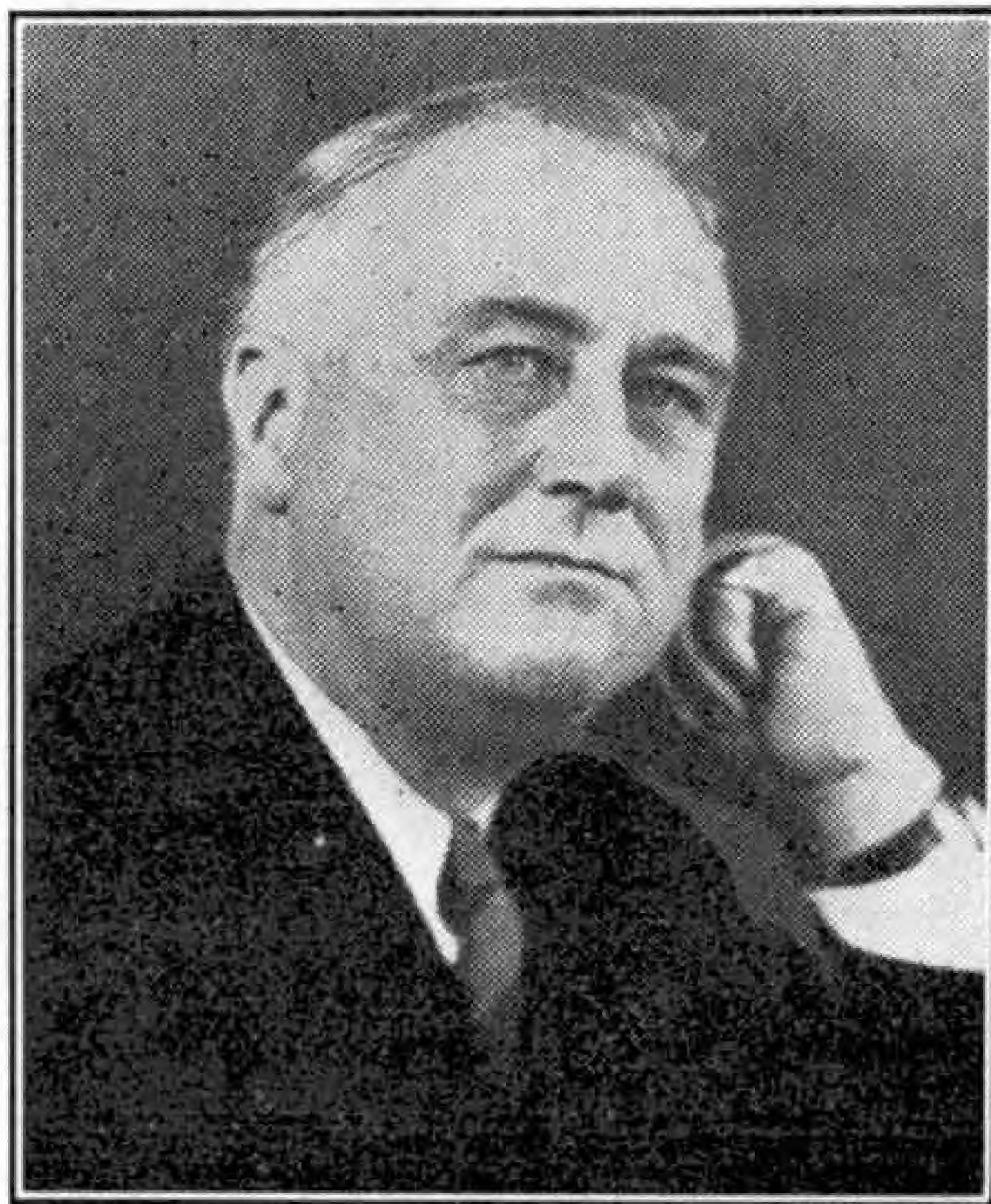
fighting the submarine menace.

His public life was interrupted for some years by illness, but in 1928 he was elected Governor of New York State. He was nominated Democratic candidate in the Presidential election in 1932 and was elected by a record majority of over 7,000,000 votes. On taking office he immediately commenced the famous "New Deal" measures, a series of sweeping reforms aimed at restoring the country's economic prosperity. He was re-elected President in 1936, and in 1940 made history by being the first President to be re-elected for a third term.

President Roosevelt now holds the position of Commander-in-Chief of the Armed Forces in his country.

Readers' Views

Last month I asked for the opinions of readers regarding the new "pocket" size of the "M.M.," and I have received an astonishingly large number of letters. The great majority not only express satisfaction with the smaller size, but urge me to make it permanent—of course, with a big increase in the number of pages after the war! My own view is that the smaller page has certain advantages, but it is too early yet to reach a final decision.



President Roosevelt.

Mechanical Surgery by Welding

By C. W. Brett, M.Inst.W.

(Managing Director of Barimar Ltd.)

WHAT is the hottest thing you can think of? Some will plump for a boiler furnace, but that must be multiplied by four or five to reach the temperature of the oxy-acetylene flame or electric arc with which 7,000/8,000 degrees F. are under the control of the operator.

Those who live in towns will have plenty of opportunity to see tram track being cut or water mains of large diameter being made into continuous lengths. In the first process severance is achieved by great heat; in the second, union is obtained. The latter, which is welding, is by far the more important, but it is interesting to note that the cutting flame is not used solely to reduce unwieldy lengths of steel rail, or bulky machinery destined for scrap, to sizes which simplify handling and transport. Machines have been developed which govern the movement of the flame so that the cut is so clean that it appears to have been made with a keen tool.

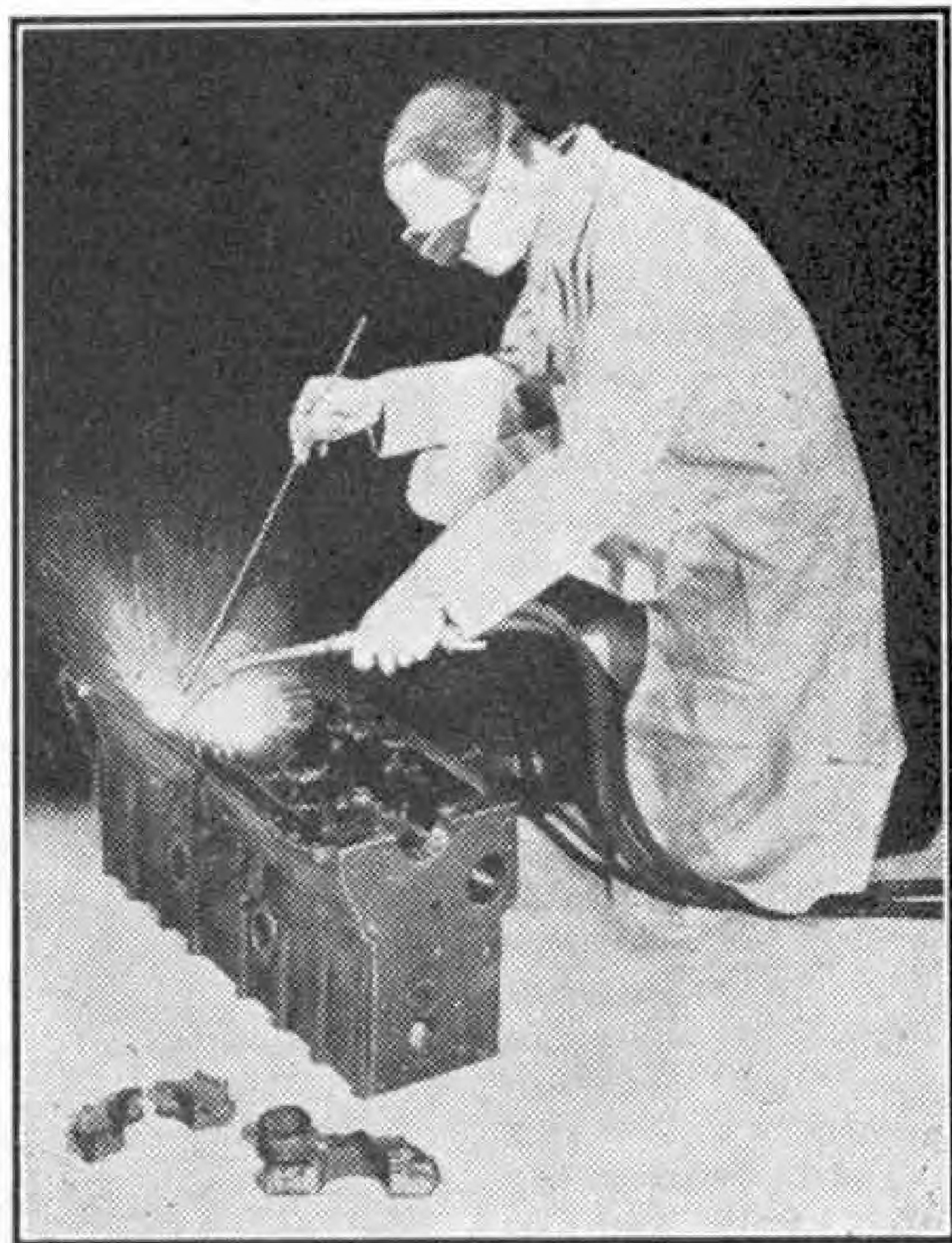
In making certain parts for aircraft and various other armaments, a stack is made, consisting sometimes of 50 to 100 sheets of perfectly flat metal and having a total thickness of up to 6 in. The oxy-acetylene flame is then applied, the exact traverse being governed by a template. Almost as quickly as it takes to tell, the sheets are cut to exactly the same shape with clean and undistorted edges. This process has been carried even further, for gear wheels of certain types, both large and small, together with all manner of chain sprockets, can be flame cut so accurately that they are ready for use without the need for any further attention.

Of course the necessary degree of accuracy could not be obtained if the operator held the cutting torch in his hands. Before the work commences the machine is set, and the speed at which the flame travels, together with its exact path, are points which must be decided; but once the job is started it is automatic until the task is completed.

Welding is having a powerful influence upon speeding-up the production of ships and reducing weight so that more cargo can be carried or greater speed obtained. German engineers realised this when they

built their "pocket battleships," for it is claimed that by using fusive methods about 1,000 tons of steel was saved, which means so much less deadweight.

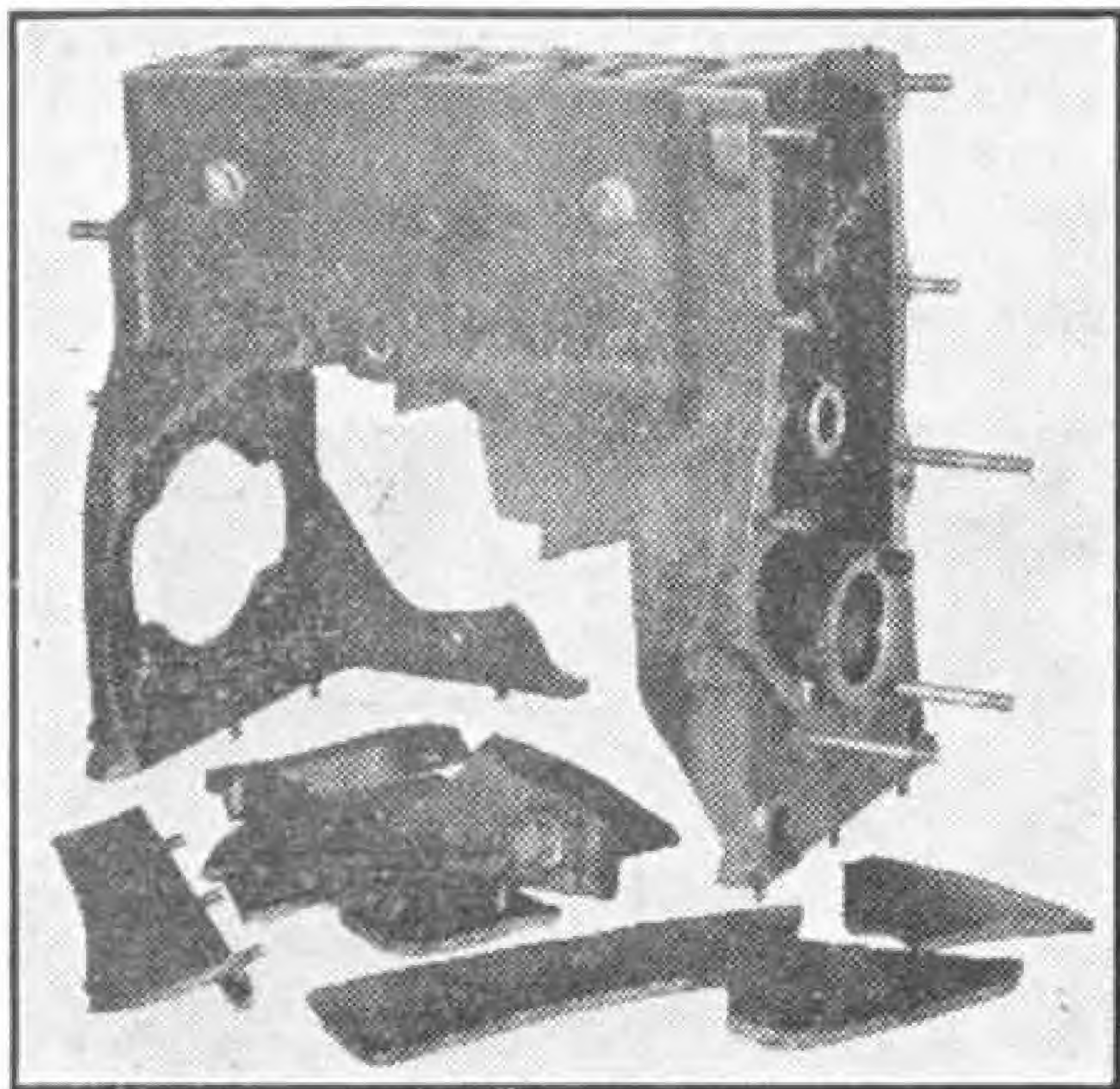
Equally important is welding in the repair of ships. In the case of direct hits from a big bomb or torpedo, the result is usually final; but near misses with bombs that explode close to a ship but do not actually touch it, can cause trouble from the concussion fracture of pipes, castings and other parts. Naval vessels can be



A highly skilled oxy-acetylene welder repairing damage to a motor car cylinder block. He is holding the welding blowpipe in his left hand, as, in this case, it is easier to get at the damage from the left side, but this welder can work just as well with the blowpipe in the right hand.

protected to a large extent by suitable design and the choice of materials which are not normally used by the mercantile fleet, which is built for peaceful pursuits and therefore more vulnerable to enemy action. This is where the welding operator comes in and renders invaluable service.

Many of the most outstanding feats of mechanical surgery cannot be described



This jig-saw puzzle belonged to a motor car and now looks ready for the scrap-heap. The welder will save it and a new cylinder block will not be needed.

at this juncture, but there will be some enthralling stories to be told in due course. There have been many instances of welding operators working in cramped quarters deep down in a ship, and perhaps in imminent danger of being gassed. Under such conditions relays of engineers, each of which perhaps can work no more than five minutes, wait their turn. Every man has a life-line so that in the event of his being overcome watchers can haul him out of the danger zone.

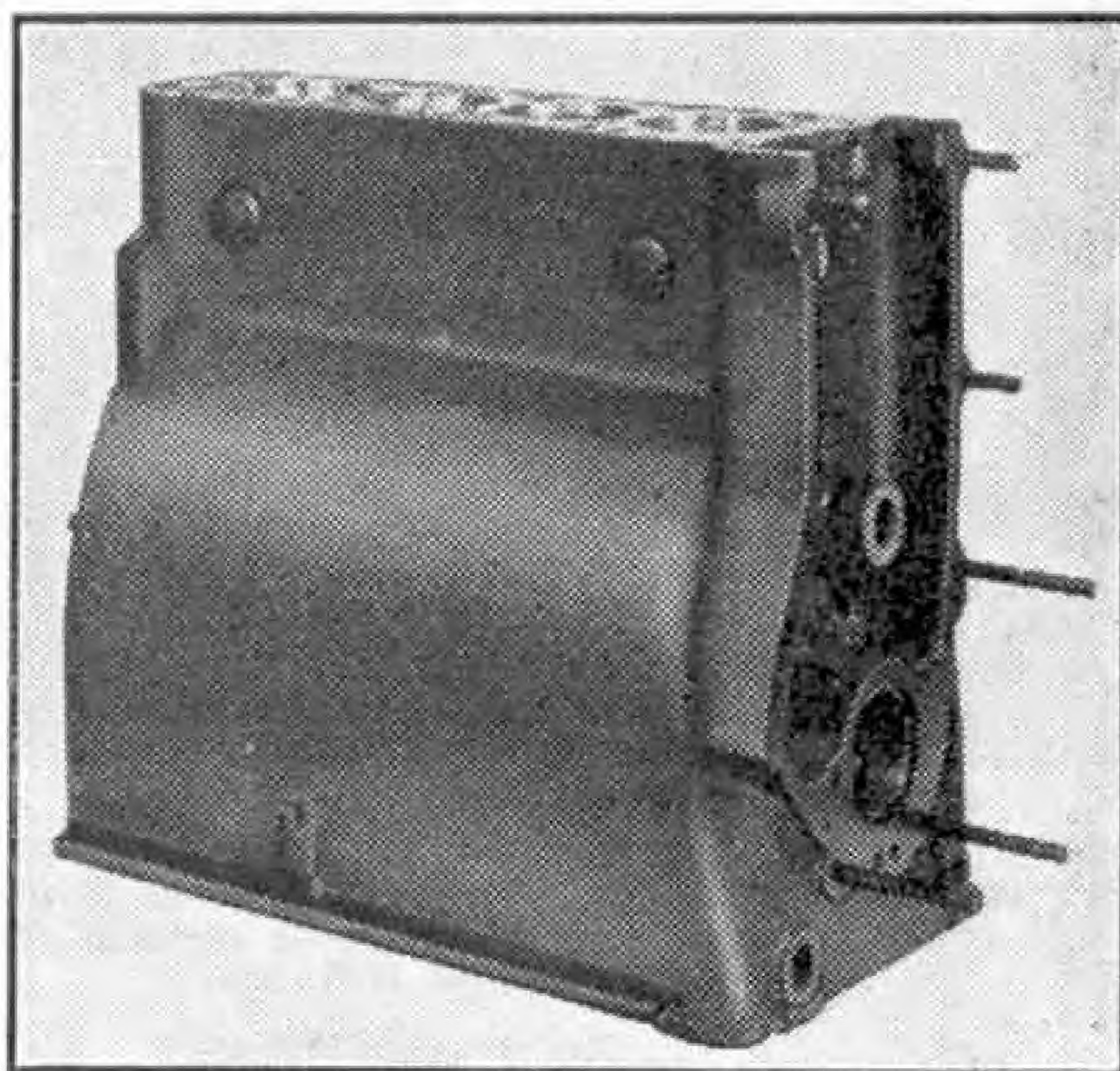
Yes, lives are risked to save time, but apart from the speed with which welding repairs can be completed, there are other important advantages. Take for instance the case of a large ship which reached port not long ago. Due to an accident and not enemy action, her large triple-expansion steam engine, developing several thousands of horse power, cracked two cylinders, in fact the trouble was so extensive that it penetrated to the valve ports and in some cases the fractures were most inaccessible.

To have fitted replacement cylinders would have been very costly, but above all there must have ensued a delay of between six to twelve months. It was this latter fact which caused the owners to seek an alternative. Scientific welding engineers inspected the job, guaranteed that the result would be satisfactory, and therefore were asked to commence work immediately the cylinders were removed. There was no cessation, night or day, until the castings were made as sound as on the day that they were first turned out. A certain amount of machining had to be done to remove surplus metal, after which there

followed Lloyds stringest tests which would have revealed the minutest flaw had there been one.

From start to finish only a few weeks elapsed before the ship left for sea once more; she made two or three voyages and then a further inspection was made. Everything was as near perfect as a marine engine can be, and the owners thereupon wrote a letter of congratulation and thanks to those who had taken part in a remarkable feat of repair work. This occasioned faint surprise, for the engineers concerned did not consider that they had done anything out of the ordinary, and they had, in the meantime, completed other difficult jobs with equal success.

Remarkable as are the achievements recorded in the welding of iron and steel, such work is not confined solely to ferrous metals. At one time copper presented some stubborn difficulties, now fortunately, all are overcome. Until a year or so ago many metallurgical chemists, including some reputed to be familiar with the progress of welding, gave it as their opinion that the uniting of dissimilar metals would hardly be possible on a commercial basis. This has proved to be entirely wrong. Patient research involving thousands of experiments has produced a new technique which, combined with a novel type of apparatus, enables all sorts of unusual combinations to be made. Even steel and aluminium can be welded together perfectly. When tests to destruction are made



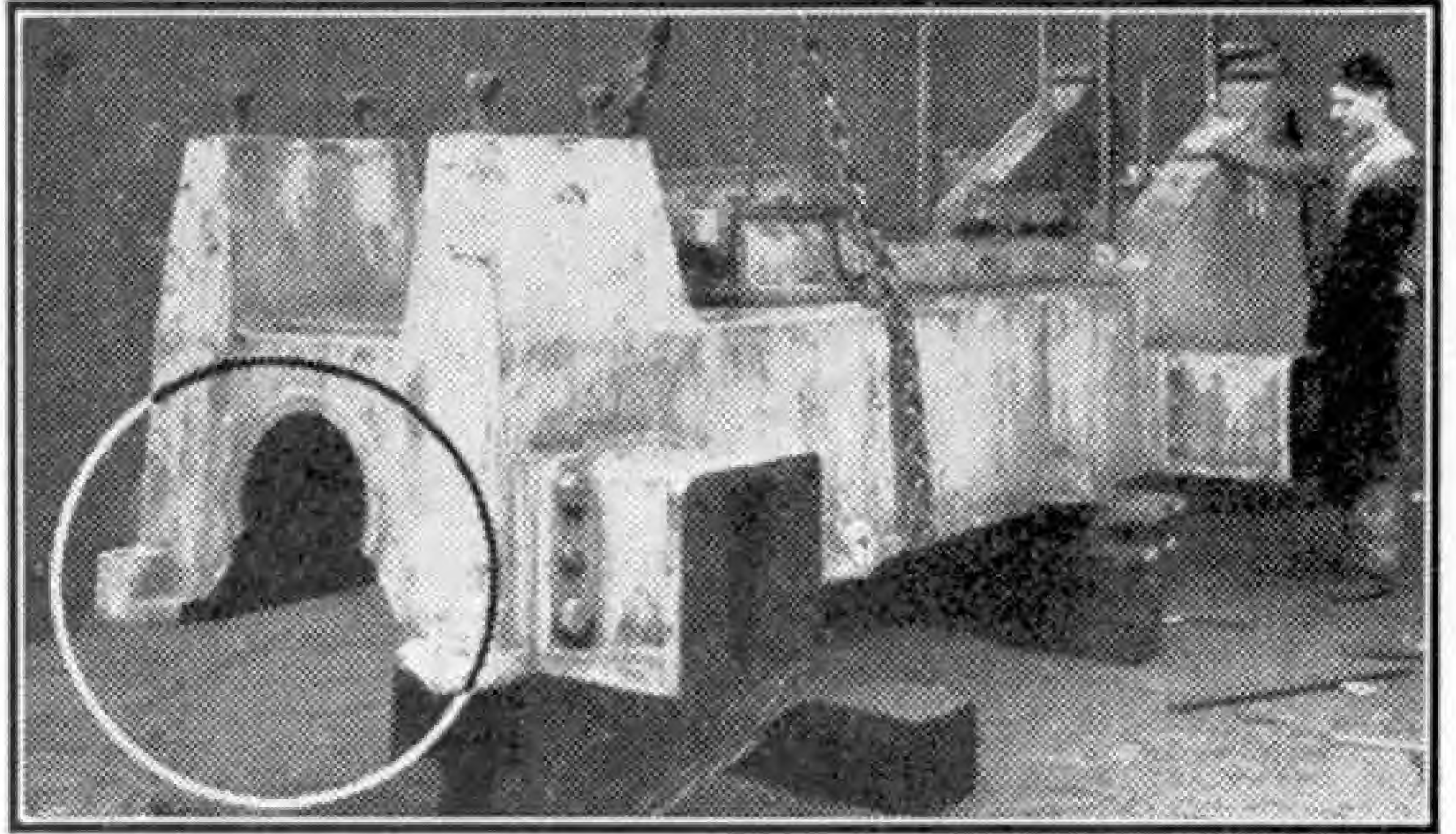
This actually is the cylinder block shown in Fig. 2. All the broken pieces were carefully fitted into place, new ones made to replace missing ones, welded together and finished off as good as new. Even a job like this costs a good deal less than a replacement.

from time to time to ensure that the highest possible standard of workmanship is maintained, the metal being literally torn apart by pressure measured in terms of tons, fracture is not in the area of union, but occurs in the weaker of the two parent metals, thus proving that a true weld is obtained.

Some readers may be excused thinking: "Well, what is there so remarkable about that?" But they may have overlooked one or two things, of which perhaps the most important is that every metal has its own particular and usually quite distinct rate of expansion and contraction. Thus, in the case of steel and aluminium the latter expands about twice as quickly as the former when heat is applied, and it is this tricky obstacle, together with others of a more technical and complex nature, that has been overcome so satisfactorily. In fact the degree of success obtained in the important field of repair work has been such that manufacturers of metal goods, and electrical equipment in particular, are already adapting their methods of production so as to take advantage of bimetal welding.

For years past scientific welding engineers have revealed that a very large

course. The war has forced the owners of motor cars and other road vehicles to seek a sound alternative now that replacement parts are difficult to secure promptly. They are finding that when severe wear has taken place new material can be welded



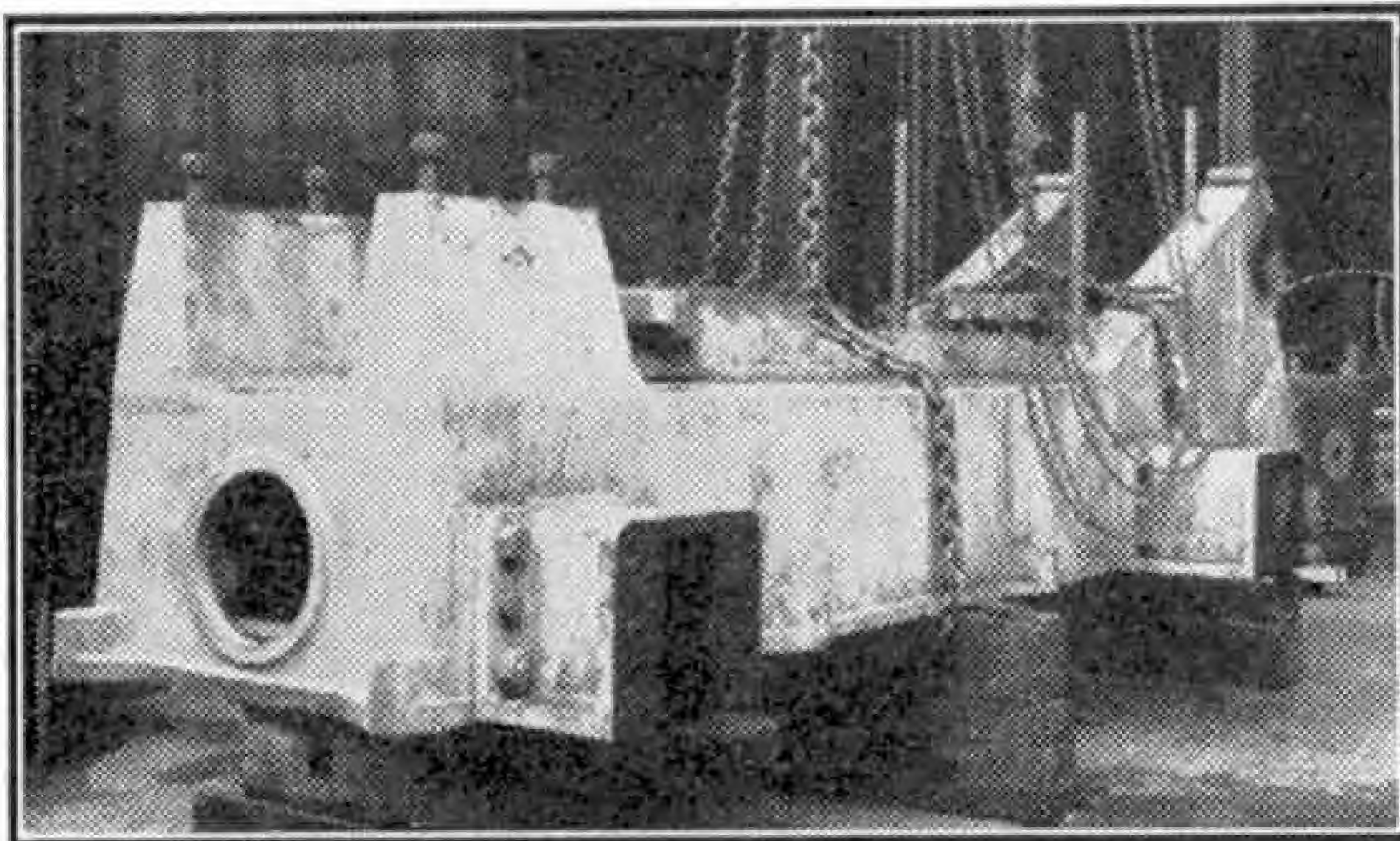
8 ton casting apparently ruined by accident on rail. Two castings like this form the bedplate of a large ammonia compressor for part of the Refrigerating Plant in an Oil Refinery. They were brand new, and on the way to the Refinery, one came loose, and a large piece was knocked out of the end of it, as shown.

on, and broken components, including crankshafts, re-united and then machined to within a tolerance of less than one-thousandth part of an inch. The result is that items treated in this way look like new, behave in the same way, but cost a great deal less. At the same time it must not be thought that welding is a wartime expedient, as it is used by innumerable engineering concerns as their chief means of maintenance.

One job that is often carried out these days is that of replacing teeth in broken gear wheels; even when these are actually missing they can be built up afresh. If a new wheel is put alongside one that has been welded and machined, the repair work gives absolutely no clue as to what has been done, and it is impossible to detect the difference without the aid of a microscope.

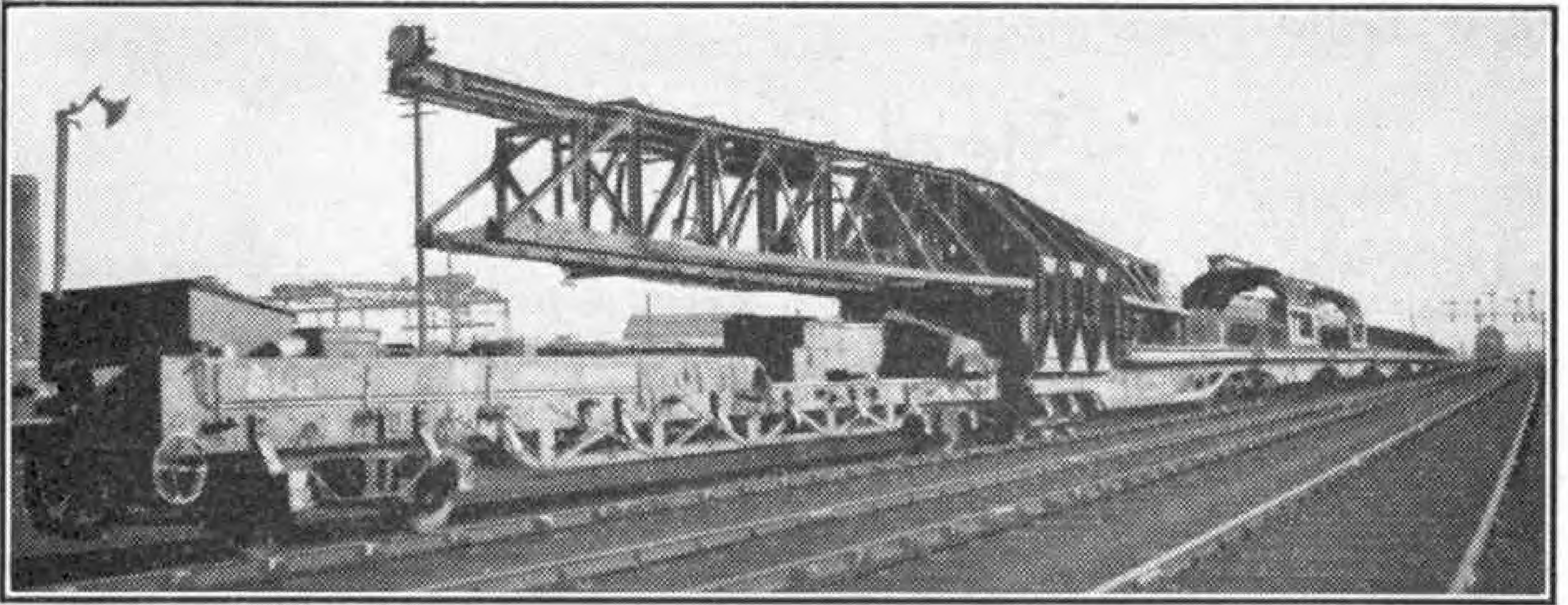
Of course there can be nothing rough nor ready about welding on these lines, and the men that do this work are true craftsmen

who have served a long and versatile apprenticeship. Moreover, almost all repairs differ from one another, making it necessary to choose this or that variation of equipment and suit the line of approach to the task in hand.



This accident might have been disastrous, because the castings had been produced specially to meet the demand for oil, needed for vital national purposes. Scientific welding came to the rescue and within five days the bedplate was perfectly restored and on its way again to the Refinery.

sum of money, together with much new material, is wasted annually just because it is a common practice to discard a worn broken metal part and purchase a replacement, in preference to having a repair which would be guaranteed as a matter of



A general view of the track-laying machine showing the crane truck close at hand, the two gantry trucks behind, and the trucks loaded with rails in the distance. When working, the match truck underneath the crane jib is of course drawn away.

An Interesting Track-Laying Machine

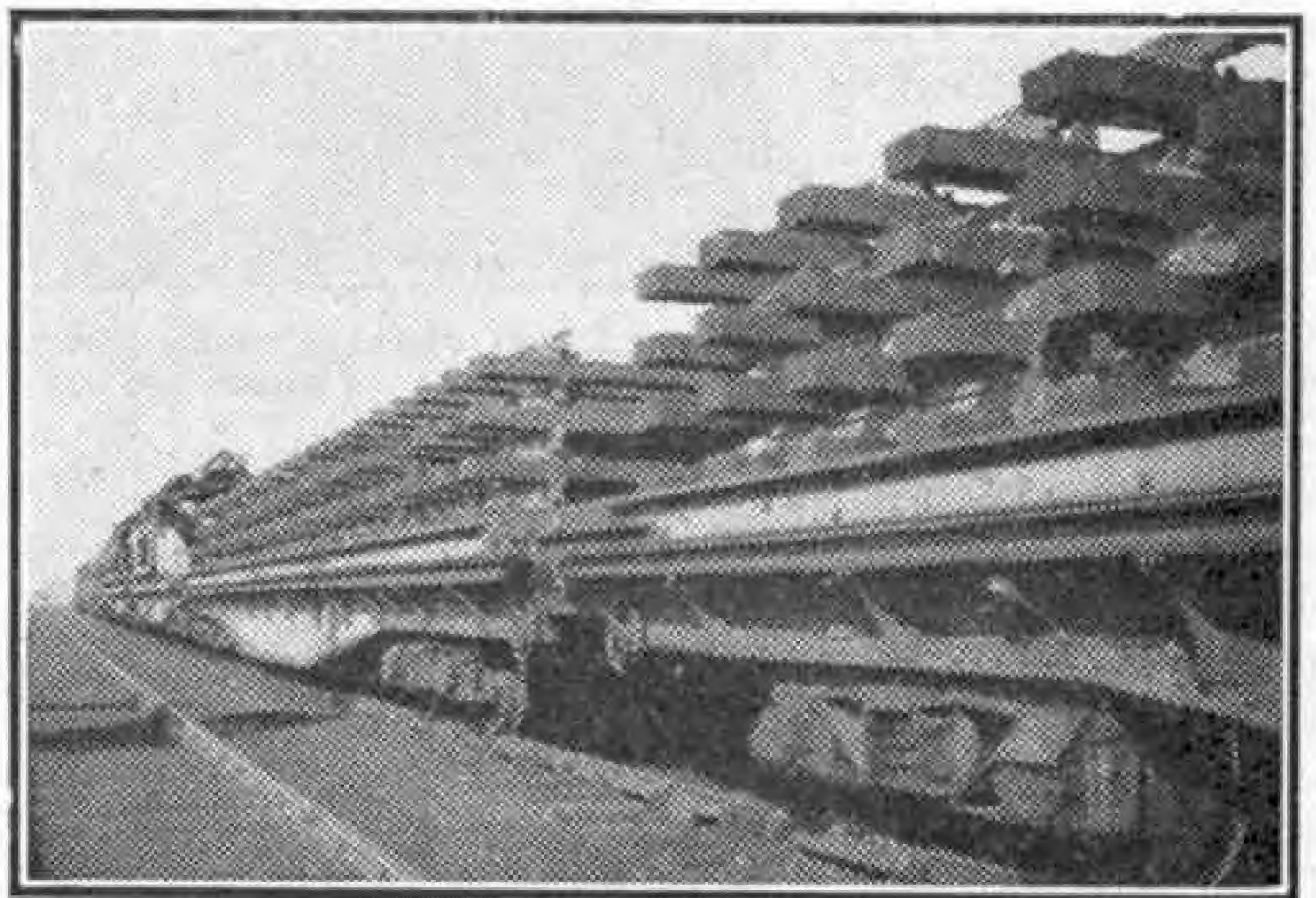
By "A Railway Engineer"

THE relaying of permanent way is always bound to cause some interference with traffic, and anything that can get the job done quicker is of great interest.

Some little time before the war a track-laying machine was successfully introduced on one of the British main line railways. It made use of a new principle in permanent way work. Hitherto the regular practice in this country has been to convey the various components of the track to the site separately. The sleepers, with the chairs ready spiked down, were placed on the road-bed, and the rails lowered into position by a gang of men. The keys were fitted afterwards. This machine is designed for a different method of working. The track is made up complete in 60 ft. lengths at the District Engineer's headquarters depot, carried to the site, and dumped finished on the road, in its correct position. Small-scale Model railway practice, in which complete track is laid in lengths, is now indeed being followed on British main lines!

On the section to be relaid, the ballast will have been shovelled away from the sleepers, and powerful cranes preceding the track-layer lift out the old track complete, dumping it at the lineside. The track-layer is then propelled forward until the horizontal jib of the crane truck

is over the empty space. The new track, loaded in tiers of four 60 ft. rail lengths on trolleys, has been drawn forward from the rail-carrying trucks, through two gantry trucks, and is now beneath the crane. The topmost length of track is now attached to the travelling pulley blocks of the crane, and carried out beyond the end of the track and lowered into position. This length is connected up to that on which



A close-up of the rail-carrying trucks, showing track loaded in four tiers.

the machine is standing; and then the whole track-layer is propelled forward 60 ft., over the piece of track just laid, into position for laying the next length. So the work continues.

HOW THINGS ARE MADE:

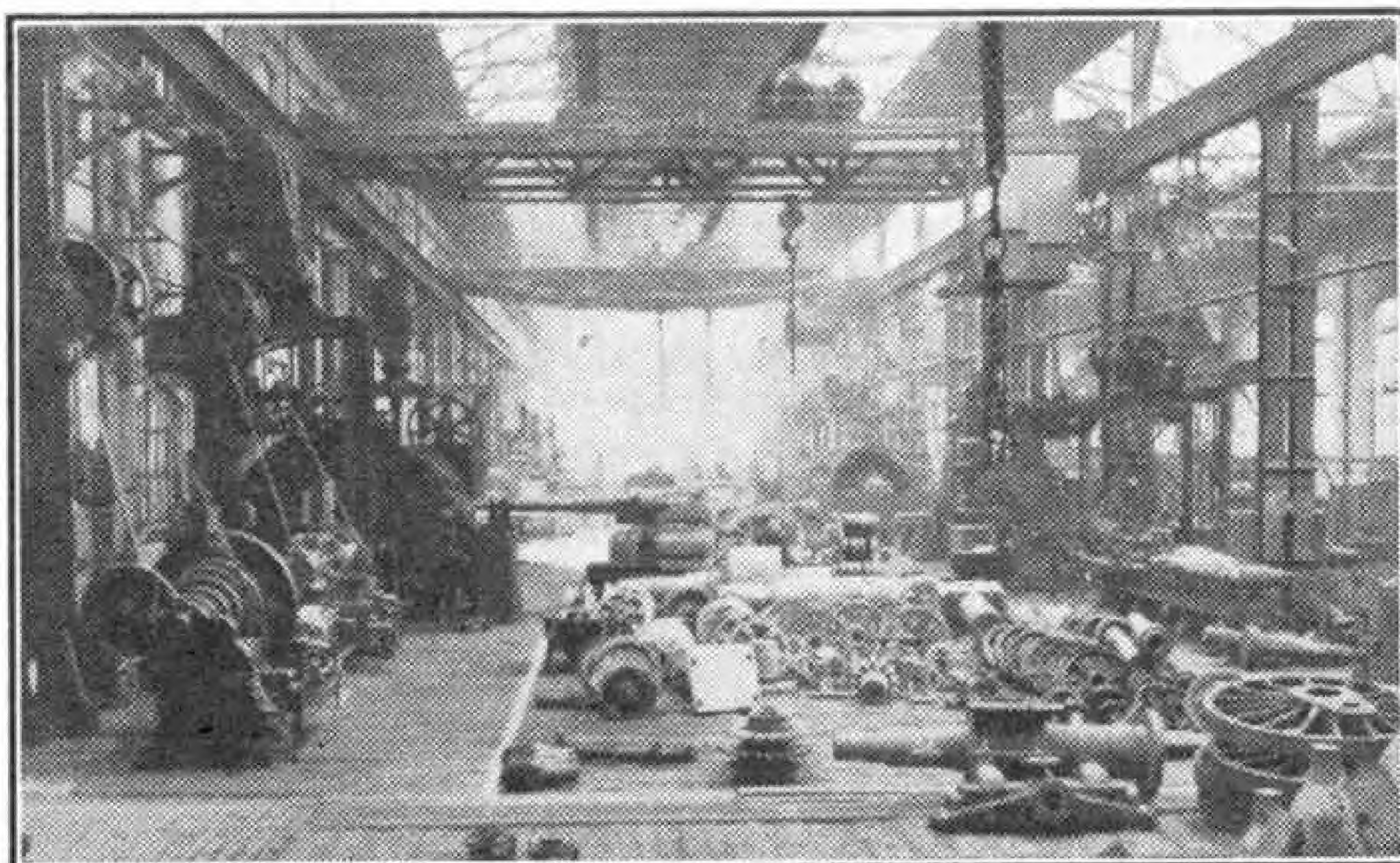
Steel Castings

MANY fabricated steel parts can be machined from forged or rolled blooms, billets and bars, but others, on account of their intricate shape or section, have to be cast in moulds of sand. In addition there are certain steels, such as nickel-aluminium and nickel-aluminium-cobalt magnet steels that cannot be forged or rolled, and therefore must be cast to shape.

The first thing required for the making of a casting is a wooden pattern. Pattern making is a highly specialised trade, quite distinct from ordinary carpentry, and demanding a very high degree of skill from those who practise it. When large numbers of small castings are required from one pattern, that pattern can be made with advantage of metal to resist wear, but even this metal pattern would originally be made from a wooden one. The wood used is usually Quebec best yellow pine, but for repetition work with small castings the harder mahogany is employed on account of its durability.

Patterns are made from blueprint drawings, and the first thing the pattern maker has to do is to decide how the casting is to be made. The art of pattern making lies in planning things so that the pattern can be withdrawn without disturbing the sand. The most accurate castings are produced from patterns that can be made to "leave their own cores"; that is those that have no internal cavities that must be made by means of inserted cores. This is not possible in every case, however, for intricacy of design and other factors often necessitate the use of cores. Another important point for the pattern maker is that the molten metal shrinks as it solidifies, and therefore if the pattern

were made the exact size of the finished casting as given on the drawing, the casting produced would be too small. All patterns therefore are made larger than the required casting by an amount known as the "shrinkage." This varies for different steels, and only practical experience can decide the allowance to be made. With castings of an intricate shape, or having a number of cores, the problem becomes even more complicated, because the obstructions thus caused to the flow of the liquid metal affect the contraction of the casting on cooling. All but the simplest patterns have to be jointed, otherwise they could not be withdrawn



View of part of the foundry machine shop of Edgar Allen & Co. Ltd., Sheffield, to whom we are indebted for our illustrations.

from the moulding box without disturbing the sand. Large patterns have to be made also with what is called "taper" or "draught," so that they can be lifted out without breaking down the sand. A machining allowance also is made where required, but this is indicated on the drawings.

The completed pattern is carefully checked for dimensions, and as an additional safeguard, when large numbers of castings have to be made from one pattern, sample castings are made before the bulk is proceeded with.

From the pattern shop the pattern goes

to the foundry to be imprinted in the sand of the moulds. Sand for steel foundry use is of two kinds, bonded sand and silica sand. Bonded sand contains clay, and forms the shape of the casting as given by the pattern, retaining this shape with-



North end of the Edgar Allen fettling shop.

out collapse when the molten steel is poured into the mould. Silica sand is a straight sharp sand containing about 98 per cent. of silica, but no clay or other bonding or binding material. It is used to dilute the more costly bonded sand, which otherwise would be too tough and resistant to the action of the rammers that press the sand about the pattern to form the shape for the moulds. Further, cores made of undiluted bonded sand would resist the contraction of the cooling metal to such an extent as to cause distortion. Before use the sand bought for the foundry is passed into a milling machine, in which the bonded and silica sands are mixed in the required proportions in such a manner as to ensure that the clay bond is distributed evenly round the grains. After leaving the milling machine the sand cakes together, and therefore is passed to a spinner in which rotating blades break it up into the powdery form required. Moisture plays an important part in the condition of the sand, and if necessary the sand is dried in a rotary dryer.

For steel castings in which extreme accuracy is required the oil sand process is often used for making the cores. Oil sand is made from silica sand, using a special binder and mixing in a vegetable oil.

The task of the moulders consists of ramming the sand, by hand or mechanically, round the pattern; withdrawing the pattern; trimming and finishing the surfaces

of the mould so as to leave clean sharp surfaces and edges; inserting any cores that may be necessary, and providing the runners, which are the channels by which the molten steel reaches the interior of the mould, and the feeding heads or receptacles for quantities of surplus metal required to make up for the shrinkage on cooling, thus preventing holes or hollows in the finished casting. Then the mould is dried in a drying stove and closed for casting.

The steel for casting usually is melted in the Siemens or a cupola furnace in conjunction with a Bessemer, Tropenas or other converter. A recent development for the production of small castings is the use of oil-fired crucible furnaces. The actual casting is a highly skilled operation supervised by trained foremen. After the pouring the mould is taken to pieces and the sand and core irons—the pieces of iron that hold the core in place—are eased away from the casting where necessary in order to allow for free contraction.

The casting thus produced is by no means ready for use. When it is removed from the mould a covering of sand adheres to it and this has to be cleared away. This is done in shot-blast chambers, in which a jet of chilled iron shot is driven against the surface of the casting by an air blast. The operator, protected by a special head-dress, works inside the chamber. There is also a more recent development known as the Wheelabrator. This is a plant in which the iron shot is not sprayed on to the castings by compressed air, but thrown on by a centrifugal force. The process results in a great speeding-up of the work and in a better finish. It also has the hygienic advantage that the castings are cleaned in a dust-tight chamber in which no operator is required.

Next the casting goes to the fettlers, who remove all fins or rough irregular accretions of metal, with pneumatic chipping chisels or hand tools. Then comes the final finishing of the casting by hand grinding machines of special design.

Before the castings leave the foundry they almost always undergo some form of heat-treatment. This varies with different kinds of steels, and the most important processes are those of annealing and normalizing. Annealing consists of heating the castings in a furnace in which the temperature can be easily controlled and maintained. A recent furnace for this purpose has a burner equipment using ordinary town gas and giving working temperatures of between 500 and 1,000 degrees Centigrade. The castings are

illustrations including the one on which this month's cover is based. The cover picture shows a steel worker pushing back the slag from the surface of molten steel in a ladle.

The Edgar Allen pattern stores are used to house patterns that customers wish to be retained for future orders. They cover an area of 1,298 sq. yds. and hold many thousands of patterns. They are fitted with the latest improvements, and an automatic sprinkler for the prevention of fire is installed. In the pattern shop

customers' patterns are modified when necessary to suit new designs or repaired if damaged. New patterns are made for customers who do not provide their own. The shop is a large airy building fully equipped with modern wood-working machinery. Dust extractors ensure a pure, clean and healthy atmosphere, and heating is by hot water installation.

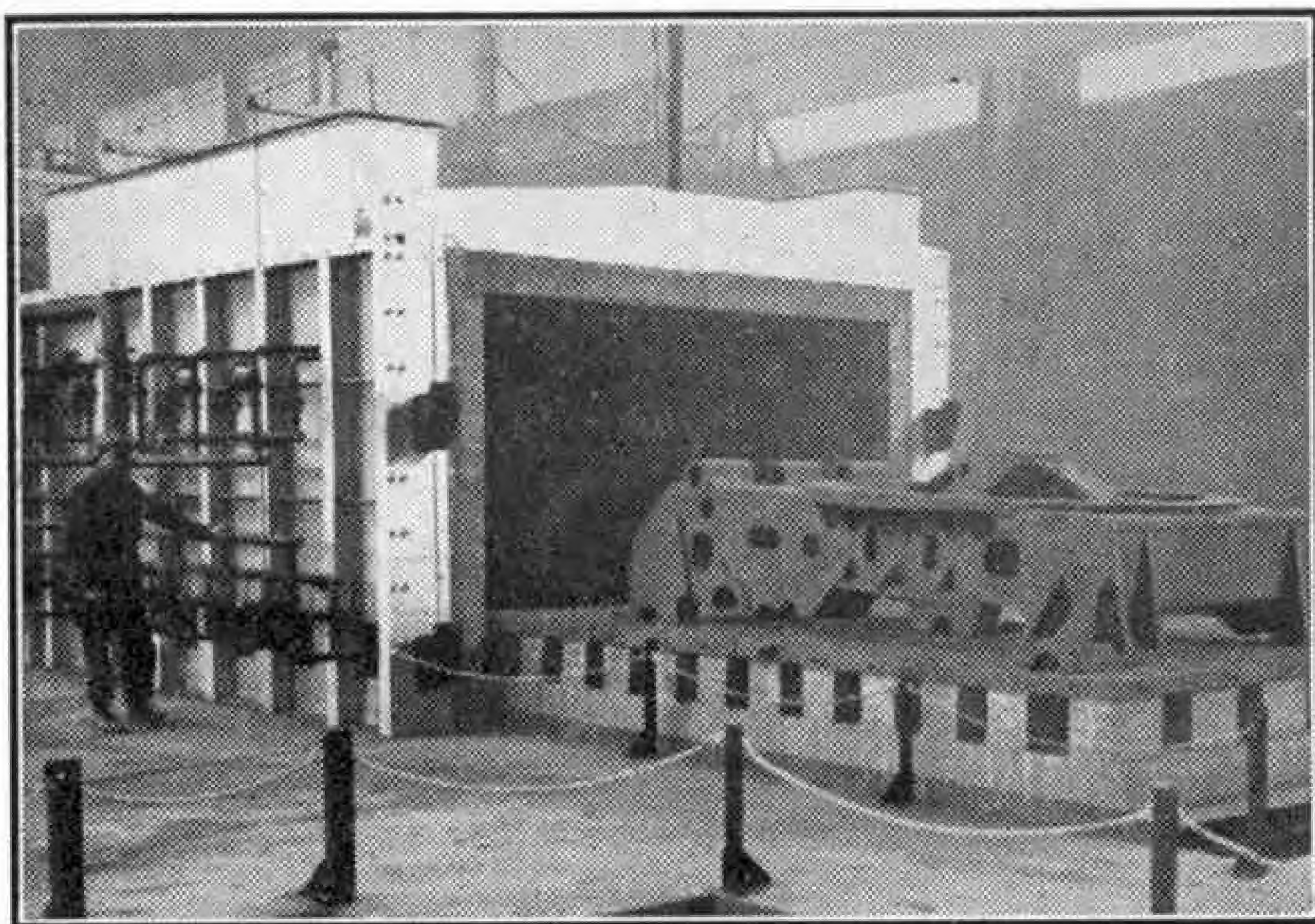
The moulding shops are provided with all sizes and types of moulding machines, from the ordinary hand machine built by the firm itself to the large

machines that lift a mould weighing five tons. The largest bay has a total length of 1,000 ft. All the machines are operated by skilled moulders, even in repetition work.

The Edgar Allen foundry machine-shop is 575 ft. long and contains two bays, one 45 ft. wide and the other 20 ft. wide. In these are located machine tools of all classes and capacities to deal with the castings produced by the steel foundry. Work can be undertaken from 14 ft. diameter down to the smallest size of steel casting made, the largest planing machine having a capacity of 20 ft. by 8 ft. by 6 ft. under the cross slide. There are also other large and well-equipped shops for annealing, shot blasting, fettling, smithing, finishing and forwarding.

The inspection department plays a very important part in the Edgar Allen foundry scheme. A record is kept of every casting made from each cast of steel supplied to the foundry, and as each heat is analysed day by day it is easy to trace and if necessary scrap

(Continued on page 87)



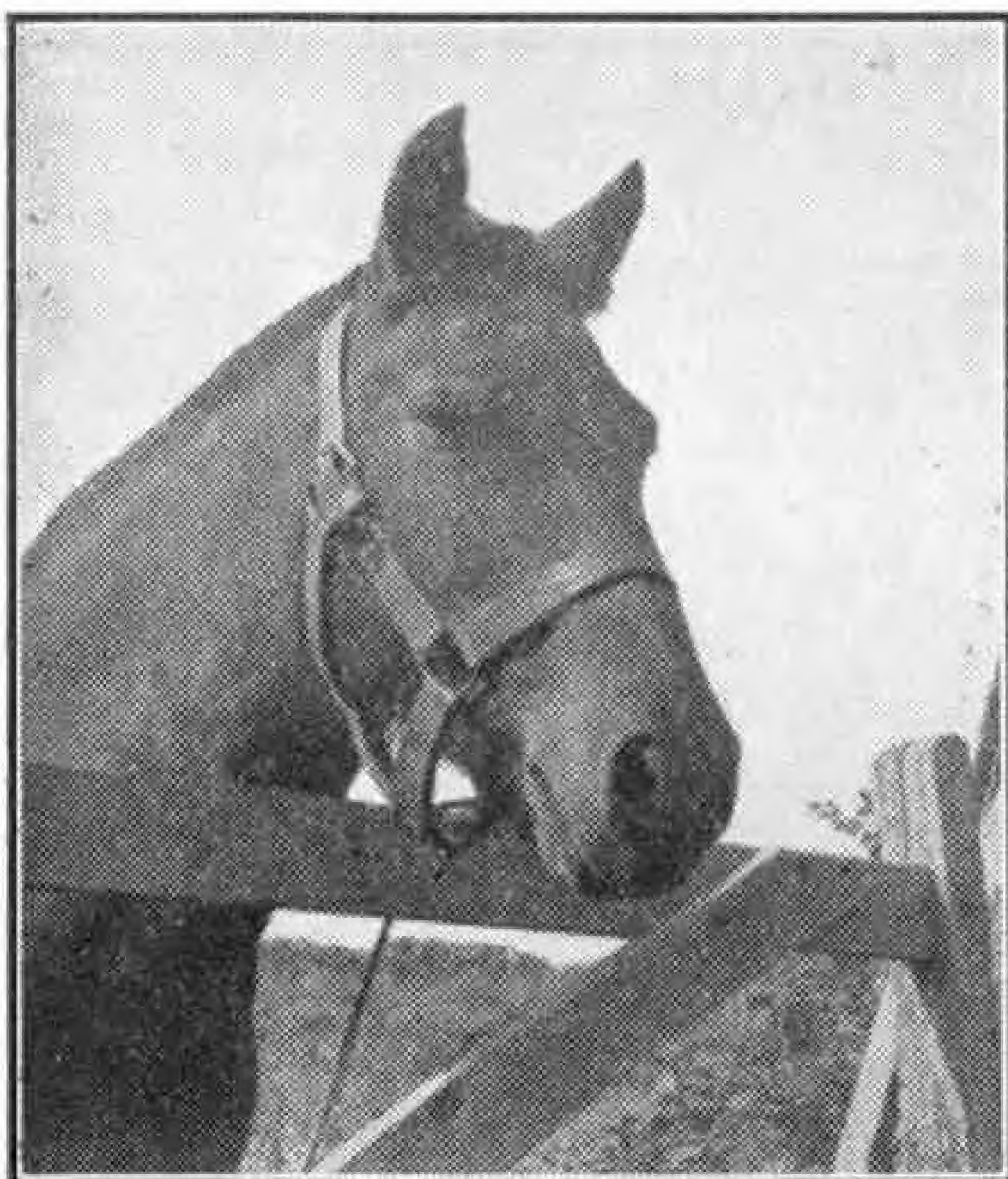
Annealing furnace showing casting ready for treatment.

heated right through, or soaked, at the required temperature for several hours, the time depending upon the mass of the castings. They are then cooled in the furnace. The effect of annealing is to remove any stresses set up in the castings during cooling, caused by uneven contraction due to variations in thickness. The process also has the effect of refining the crystalline structure.

In normalizing, the castings are first heated and then allowed to cool in the air. This process produces a rather finer crystalline structure than does annealing, and improves the tensile strength.

Another process is quenching and tempering, but this is employed only in special cases. The annealed castings are heated, quenched in water, oil or air, according to the composition of the steel, then re-heated and finally cooled in air.

A fine example of a modern steel foundry is that of Edgar Allen and Co. Ltd., Sheffield, to whose courtesy we are indebted for much of our information and for our



"Peter." From a photograph by B. Chulindra, Wade-bridge.

THE restrictions brought about by the war have affected amateur photographers in various ways, notably in limiting the subjects that can be photographed and in producing a scarcity of films and printing papers.

The limitations of subject have been referred to several times in the "M.M." The printed list of forbidden items looks very formidable, but actually it amounts to this. Photographs must not be taken of anything connected in any way with the fighting Services and their operations, of anything connected with the production or transport of munitions, or of scenes of damage due to air-raids. A little commonsense will enable the photographer to avoid trouble in this direction.



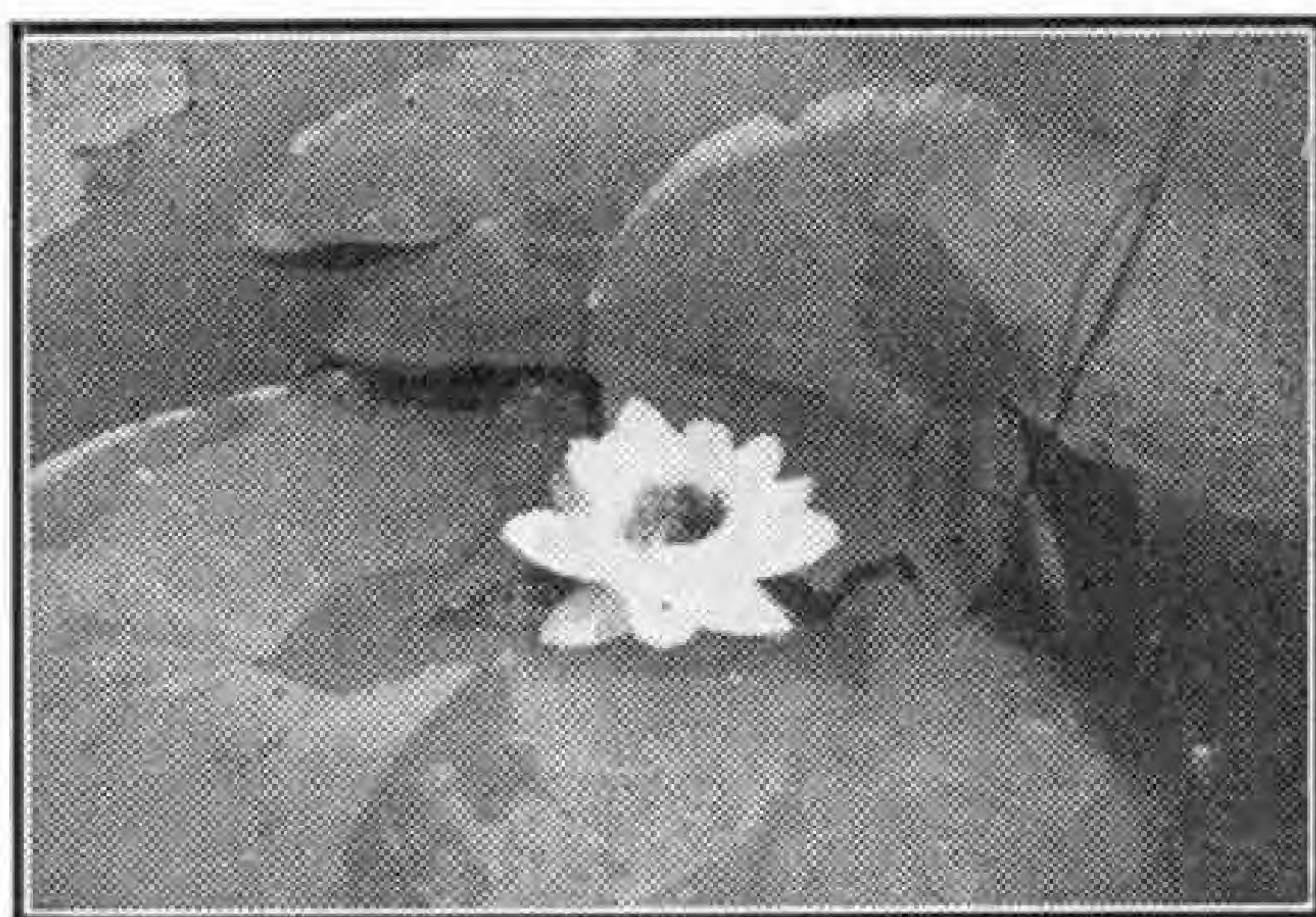
"Happy Days." G. Inson, Cootamunda, N.S.W., Australia, is the author of this jolly "snap."

Photography

Making the Most of Things

As to shortage of materials, all that can be done is to make the best of our scanty supplies by avoiding waste of any kind. The casual snapshotting of peacetime, trusting to luck for a passable result, must be abandoned. Before taking any photograph we should first consider carefully whether it is really worth while, and then make sure of a good result by giving as nearly as possible the correct exposure. The "old hand" may be capable of estimating the exposure, but most of us need the aid of an exposure meter or calculator, or of exposure tables of some kind, especially at this time of the year.

When a spool of film has been correctly exposed, it still remains to turn out good negatives, and the best way to ensure this is to use a developing tank. This method actually puts the beginner on a level with the experienced photographer. The films are placed in the



A charming picture of a water lily by I. Alexander, Giffnock, Glasgow.

tank and developed in a solution of a definite strength for a definite time varying with the temperature of the solution. The instructions supplied with each tank are simple, and with reasonable care good results are certain.

From the good negatives produced in this manner it is easy to make good prints on gaslight paper, and so the process is completed.

Correct exposure and correct development lead to a good print of every picture we take. Some of our prints may indeed not be perfect, but there are no failures, and we have made the best of our limited material.

Railway News

"Caerphilly Castle" and "Flying Scotsman" Meet Again

Some of our readers may remember that during the first year of the British Empire Exhibition, at Wembley in 1924, G.W.R. 4-6-0 "*Caerphilly Castle*" and L.N.E.R. 4-6-2 "*Flying Scotsman*" stood almost side by side, a factor that led up to the memorable trials between the two types in 1925. It is interesting therefore to hear that not long ago those same two engines passed one another on the Great Western and Great Central Joint line not far from London; the "Castle" was hauling a Paddington-Birkenhead express at the time, and the "Pacific" was on a fast freight train bound for Marylebone, thus illustrating the many uses to which big engines are put in wartime.

Locomotive News

We have recorded several more interesting examples of locomotives being on temporary loan to other companies lately, with the result that they have been seen at work far from their usual areas. Among these may be mentioned rebuilt Stirling 4-4-0 "F1" class locomotives of the Southern, which were built originally for the former South Eastern Railway round about 45-55 years ago and are now to be found on the L.M.S. Gloucester-Bristol division. S.R. 4-6-0s of the "S15" mixed traffic and N15x "Remembrance" express 4-6-4T classes have been noted working fast G.W.R. freight trains between London and the West Midlands. Southern 4-4-0s also have been reported far from home, in the north of England.

It appears that it is the intention of the L.N.E.R. to paint all types of locomotive unlined black at present, as at least four of the streamlined "Pacifics" that have recently passed through works are now in traffic "dressed in black," and examples of "V2" 2-6-2 and "B17" 4-6-0 engines so repainted also have been observed. Lettering and numbering is to remain unchanged in style.

During their short, but momentous existence, the "A4" 4-6-2s have appeared in several colours. Some have been silver grey, some green, and recently all were garter blue, which perhaps will return when normal conditions can be resumed.

We learn that L.N.E.R. "Pacific" No. 4473 "*Solario*" is another conversion from "A1" to "A3" type. A 220-lb. per sq. in. boiler has been fitted, with the Gresley type steam collector dome.

On the G.W.R. "Hall" class 4-6-0 unnamed mixed traffic locomotives numbered 6920-3 have been noted at work.

Rails a Mile in Length

Continuous rails more than a mile in length are now installed on a section of the Illinois Central System, in the United States. To make these rails sections 1,056 ft. in length were produced by welding together 16 lengths of rail each of 66 ft. The long sections so produced were then moved on flat cars to the point where they were to be used and there they were welded together to make continuous rails more than 7,000 ft. in length.

The welding was carried out on assembly line methods. The 66 ft. sections were fed into a large pressure-welding machine housed in a special railroad car, and the rails were then rolled along conveyors for trimming heat treatment and grinding in succession before they were loaded on the flat cars required to transport them. No difficulty arose in this operation in spite of the immense length of 1,056 ft. sections, for the rails bent freely when curves were being negotiated.

A New Wagon Every 37 Minutes

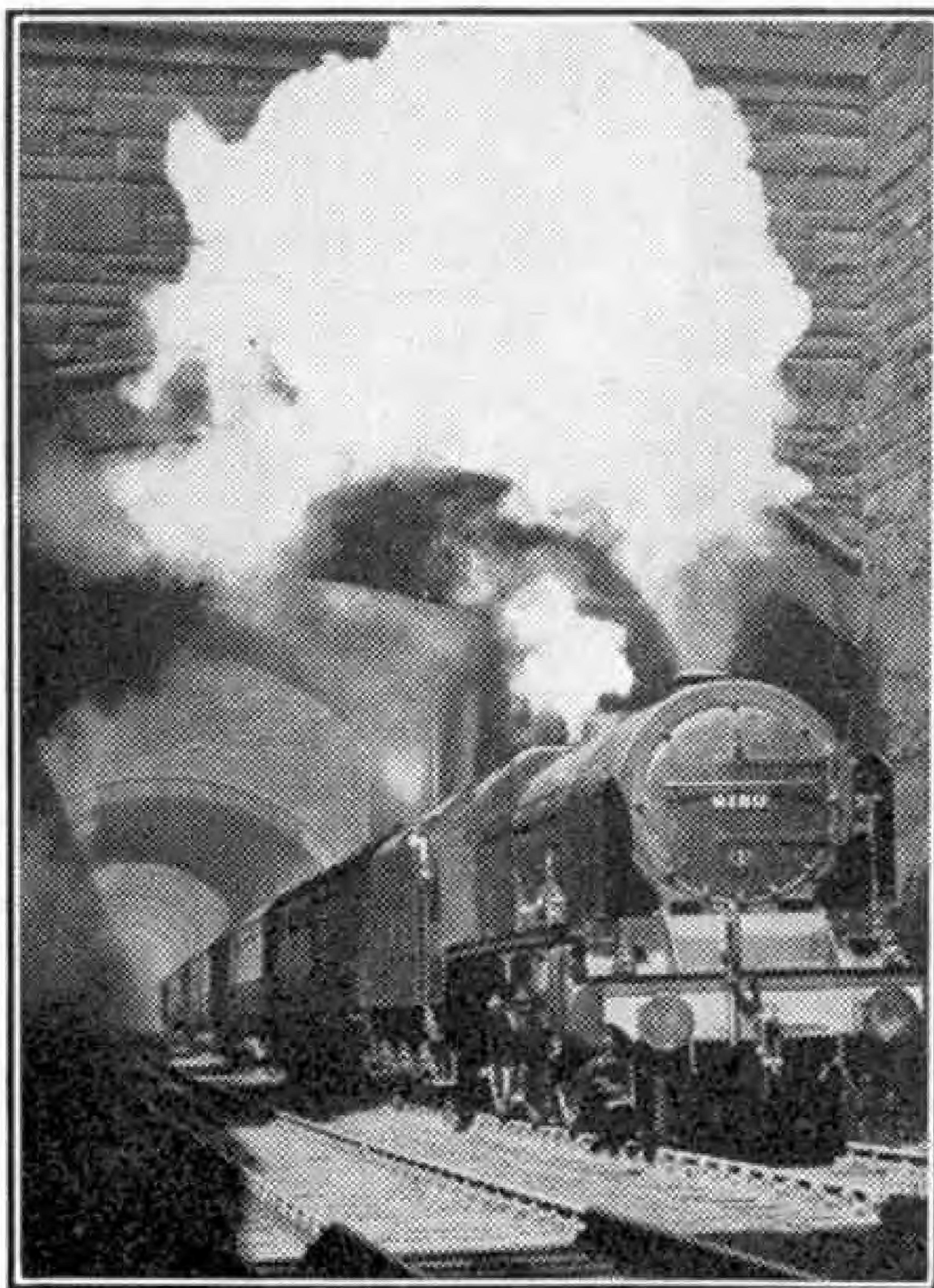
At an S.R. Works 1,000 steel-framed open wagons were recently turned out in record time for shipment overseas on Government account. A normal year's

work was finished in just over two months and during the peak of production a complete wagon was turned out ever 37 minutes! Other plants assisted by producing parts.

"Merchant Navy" Engines on Heavy Work

At the time of writing there are three of the new S.R. 4-6-2 express locomotives at work. The latest No. 21C 3 "*Royal Mail*," recently hauled a 530-ton test train, formed of 16 heavy corridors, from Waterloo to Salisbury. From a restart from Woking the 6.6 miles to mile-post 31 were covered in 9½ min., with an acceleration to 60 m.p.h. up the 1 in 298. Short, more nearly level stretches were covered at averages of 69-72 m.p.h. with a maximum speed of 74.

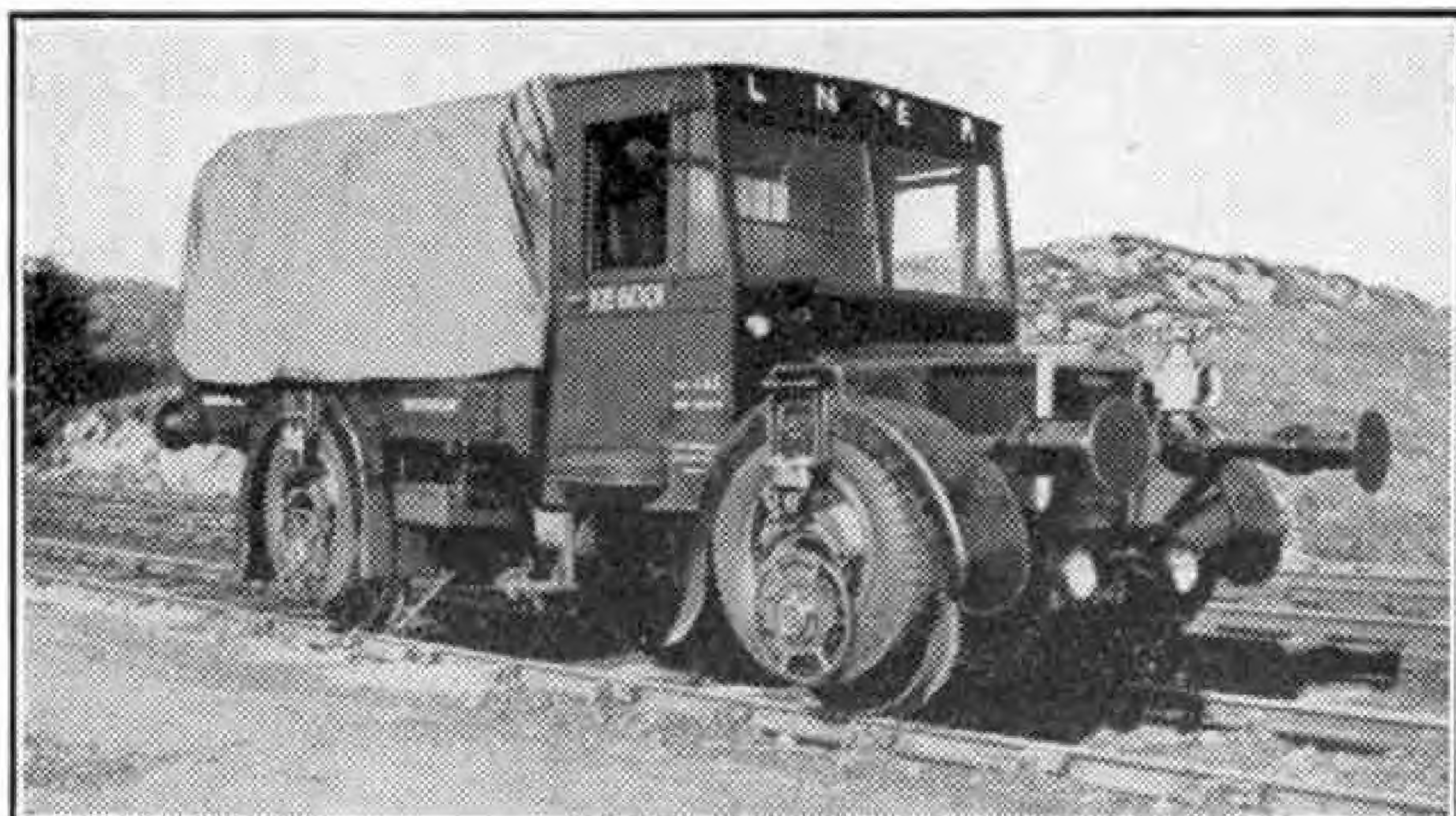
From Salisbury to Exeter the second "Pacific" No. 21C2 "*Union Castle*" took the same load, which



Climbing out of the tunnel. L.M.S.R. "*Royal Scot*" No. 6130 "*The West Yorkshire Regiment*" in a striking setting. Photograph by Rev. E. Treacy.

constituted the heaviest passenger train ever worked over the steep Honiton and other climbs of the route by one engine at express schedule. Axminster to Sidmouth Junction took 23½ min. start to stop for 14½ miles, including the formidable Honiton bank, with its many curves and its 1 in 80 for 4½ miles, up which the minimum speed was 25½. On the 1 in 132 through the tunnel to the summit the engine accelerated to 26½-27 m.p.h., with a succeeding maximum of 79 down the 1 in 100 to Sidmouth Junction. The 12½ miles on to Exeter, start to stop, were run in 15 min. 8 sec., with a top speed of 75. Under war conditions these engines are being used a good deal on heavy freight trains.

It is estimated that 100,000 special trains have been run by the British Railways for direct war purposes since the beginning of the war.



A Ro-rail vehicle. This can be converted quickly from rail to road running and is used in mountainous districts where track maintenance supplies can best be conveyed by road to the stations and then down the line. Photograph by O. S. Nock.

Concrete "Pot Type" Sleepers on the G.W.R.

Suitable timber for railway sleepers is in limited supply at present, as much of it is normally imported from Baltic countries or from Canada. An apparently successful substitute is in use in a new form on a section of G.W. goods line that carries a heavy but not fast moving traffic. Two separate reinforced concrete blocks or "pots" are placed one under each rail at frequent intervals. Each "pot" contains about 22 ft. of round steel bar in the form of a shallow rectangular cage filled with concrete, and 12 of them weigh a ton. The rails rest in chairs secured by keys, the chairs being fixed to the concrete sleepers by bolts, with a bearing pad in between. As a general rule alternate "pots" are connected across the "four-foot way" by means of a steel bar fastened to the inner chair bolts.

Experience with full length concrete or ferro-concrete sleepers has not been entirely satisfactory on main lines. These are very heavy to handle and are liable to break under the severe pounding of the largest locomotives operating at high speeds.

American Diesel Developments

In our article under the above heading on page 337 of our November 1941 issue we described new coaches and Diesel-electric power plants for the streamliners "*City of Los Angeles*" and "*City of San Francisco*." In this article we stated that the existing equipment on these services was to be replaced by the new trains. This suggests that only one "*City of Los Angeles*" and one "*City of San Francisco*" are in operation, but this is not the case. Before the new streamliners entered service late last summer the railways concerned operated one 5,400 h.p. 17-car "*City of Los Angeles*" streamliner, one 4,000 h.p. 14-car "*City of Los Angeles*" streamliner, one 5,100 h.p. 17-car "*City of San Francisco*" streamliner, and one super-standard streamlined steam train known as the "*Forty-Niner*." When the newest streamliners were put into operation the 14-car streamliner was taken out of service and its power plant and some of its cars were used to enlarge and modernise the "*City of Portland*" streamliner. The "*Forty-Niner*" also was taken out of service, so that now the service from Chicago to Los Angeles and San Francisco consists of two 17-car streamliners operating between Chicago and Los Angeles, and two 17-car streamliners operating between Chicago and San Francisco.

It should be noted that while it was originally announced that the two new streamliners would be 18 cars in length, as stated in our article, they actually went into service as 17-car trains. The "*City of Los*

Angeles" is owned and operated jointly by the Union Pacific and the Chicago and North Western Railroads; the "*City of San Francisco*" is owned and operated jointly by the same two systems in conjunction with the Southern Pacific Railroad.

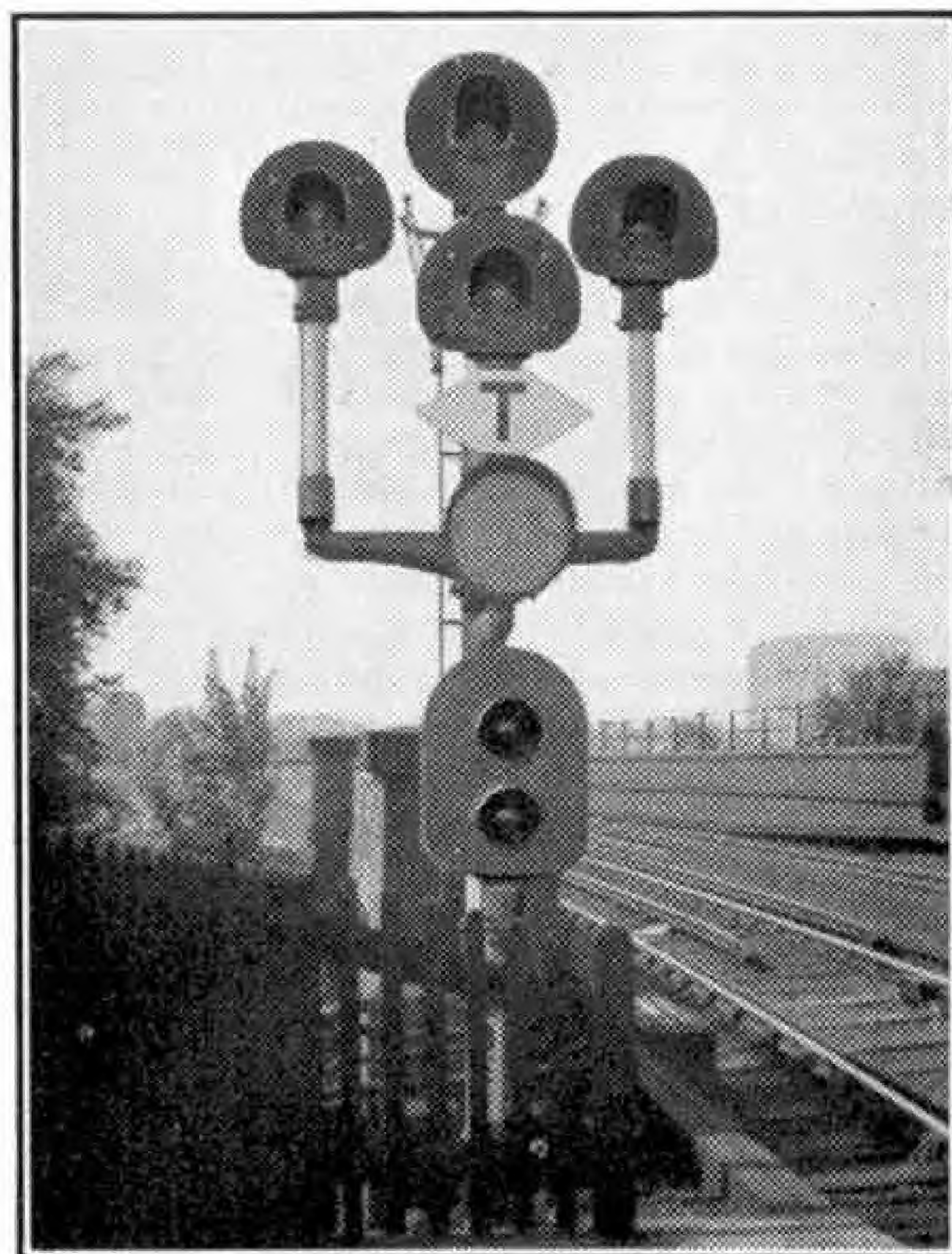
"Bristol and Exeter" Relics

Two oak office chairs were recently presented to Taunton Museum by the G.W.R., which are nearly 200 years old and lettered "B & E." They were the property of the Bristol and Exeter broad gauge railway which was opened in 1844 and incorporated as part of the G.W. system in 1876. By 1874 "mixed gauge" had been laid as far west as Exeter, also between Truro and Penzance; that is to say a third or middle rail enabled engines and rolling stock built to the otherwise standard 4 ft. 8½ in. gauge to run over the route as well as broad gauge trains. The broad

gauge of 7 ft., was finally abolished in 1892.

British Locomotives on Overseas Service

It is officially announced that fifty L.M.S. 2-8-0 engines of the latest Stanier type, but equipped for burning oil fuel, were recently ordered to be dispatched immediately to the Middle East on behalf of our Russian Allies. In addition 92 of the L.N.E.R. type "04" 2-8-0s have been "called up." These are of the former Great Central type of Robinson design that was standard for military use during the war of 1914-1918.



An unusual junction signal on an electrified railway. When the indicator below the "T" sign is lighted it displays the words "Track Dead" to show that current in section ahead is switched off owing to track repairs or other work in progress. Photograph by O. S. Nock.

World's Longest Conveyor System

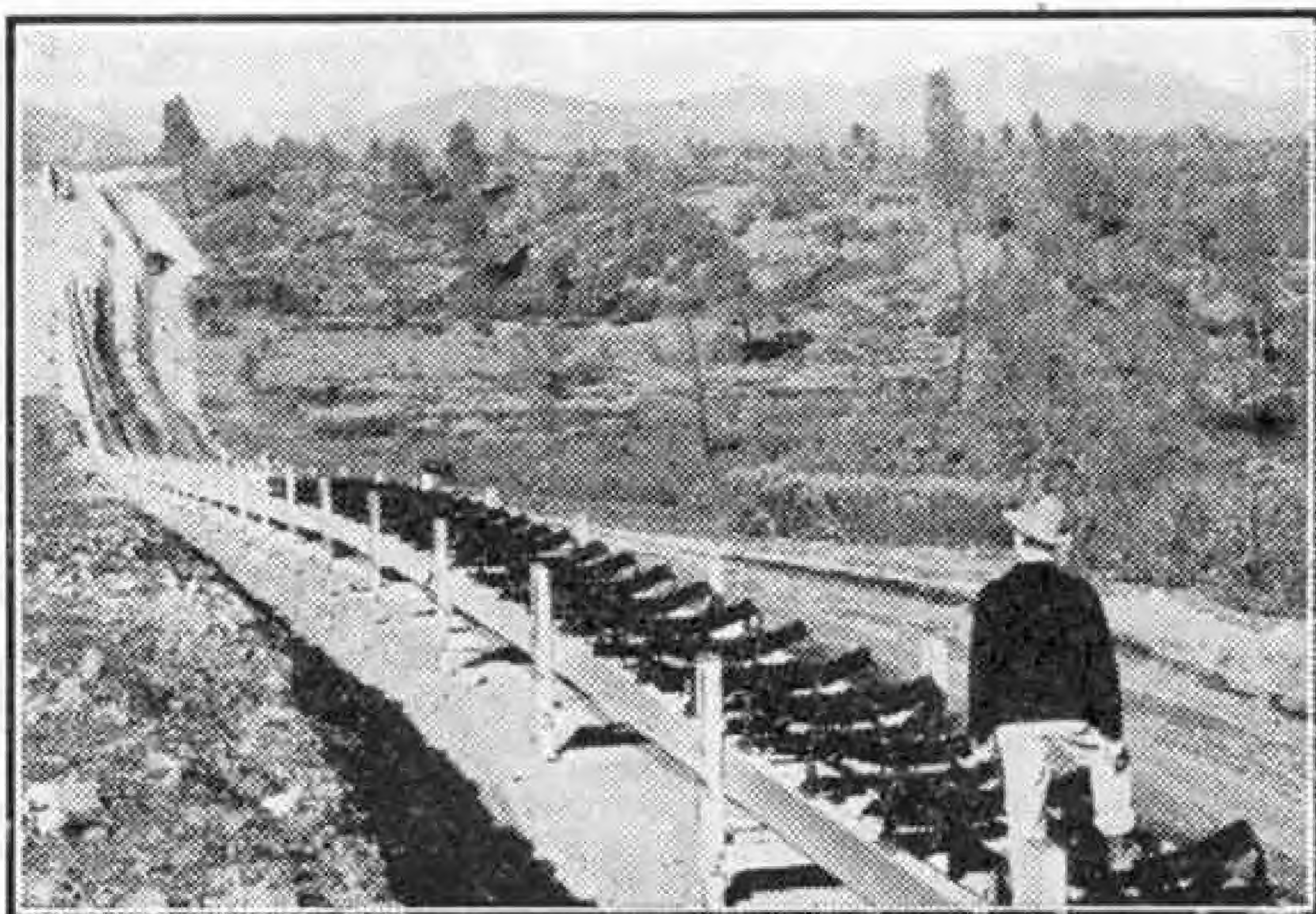
Transporting Millions of Tons of Gravel

A STRIKING example of the vast quantities of material that are required for a great engineering project, and also of the need for making special provision for delivery to the place where this material is needed, is furnished by the Shasta Dam. This giant concrete structure, now being built by the United States Bureau of Reclamation, will be the second largest of its kind in the world. It is being placed across the bed of the Sacramento River, in Northern California, and will be completed in 1943. For the making of the concrete required it is estimated that 5,800,000 barrels of cement will be necessary, together with 7,600,000 tons of gravel and 2,800,000 tons of sand. All this material has to be delivered in a regular stream in order to keep the concrete-mixing plant at work supplying the material for the construction of the Dam itself, and when this work reaches its peak, some time this year, 16,000 tons of gravel and 6,000 tons of sand will be required every day.

The production and transport of the immense quantity of gravel and sand required has proved in itself to be an engineering task of some magnitude. Efforts to find suitable material began as long ago as 1936, and more than 50 gravel beds and rock deposits in the area in which the Dam is being built were carefully examined. This meant digging about 450 pits to see what kind of material was available, and taking hundreds of drill samples for testing in the Laboratories of the Bureau.

In the end it was decided to make use of deposits on a site 12 miles down stream from the position of the Dam. The place selected has an interesting history. In 1844 Major Pierson B. Reading, a pioneer settler of the West, received from the Government of California at that time a large tract of land on the bank of the Sacramento River, and this he developed into a famous ranch of 26,632 acres to which he gave the name Rancho San Buena-ventura, which means the Ranch of Good

Venture. It is from a boulder-strewn flat at the bend of the river in the north east corner of this ranch that the gravel and sand for the construction of the Dam are obtained. It is interesting to remember that this part of California has been the scene of considerable gold-mining activity, including the dredging of gravel pits for the precious metal. There may indeed be gold in the gravel intended for the Shasta Dam, and the owner of the land and the company extracting the gravel contem-



A general view of the 10-mile conveyor that carries gravel and sand for use in building Shasta Dam. The rollers are seen in position ready for the belt.

plated installing a gold-recovery plant.

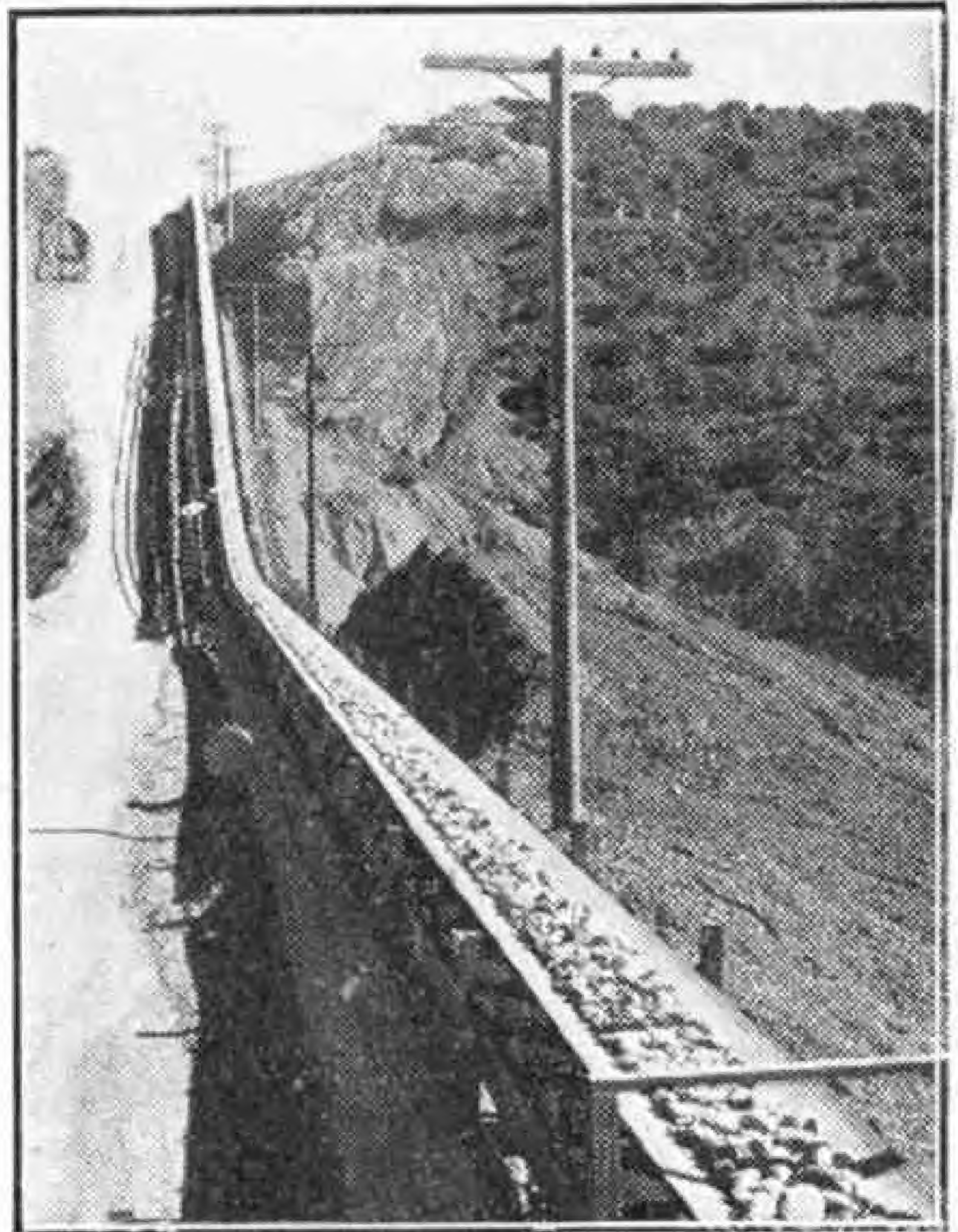
When it had been decided where to obtain the necessary gravel the next question was to consider how to transport the immense quantities required to the Dam site. Originally it was intended to construct a railway four miles in length from the deposit to the main line of the Southern Pacific Railway, but the contractors for the supply of the material made another suggestion. This was that they should build a long series of belt conveyors that would carry the gravel and sand in a continuous stream. The proposal was accepted, and now this conveyor system, the longest ever constructed, stretches in almost a straight line to a point just downstream from the Dam, a distance of nearly 10 miles. It climbs hills, dips down into valleys, crosses the Sacramento River twice, and passes over

the main line of the Southern Pacific Railway and several important roads. In addition it spans four creeks or canyons. At the delivery end its length is extended by an additional conveyor a mile in length that carries the gravel to stock piles and thence to the concrete-mixing plant.

Most of the framework that supports the conveyor belts is of wood construction, but at one point where a deep canyon is crossed steel bents each 90 ft. long are used. Each flight of the conveyor is operated by a 200 h.p. motor, with the exceptions of the last four, which run down the east slope of the Sacramento River canyon. This descent is so steep that the conveyors on it are equipped with motor generators, which use the energy of the loaded belt to produce some of the power needed to haul the gravel over the hills on preceding flights.

About 100 years ago grizzly bears were so numerous in the district through which the conveyor passes that Major Reading specially mentioned in his journal the well-worn trails they made. The grizzlies have gone, but there is a monster at work in the area to-day. This is a gigantic walking dragline that strides ponderously about, "like a duck on crutches," to use one description of its action. It has a boom 140 ft. in length, which it stretches out to pick up 11 tons of material at a single scoop.

A second smaller dragline helps the giant to load the material from the gravel pit into a hopper at the end of the conveyor that carries it to what is known as the raw stock pile. This holds about 8,200 tons of material and is near the washing and screening mill. There over-size rock is reduced to a maximum of 6 in. by means of a jaw-crushing machine, while the gravel is washed and passed through rotating screens in order to grade it into



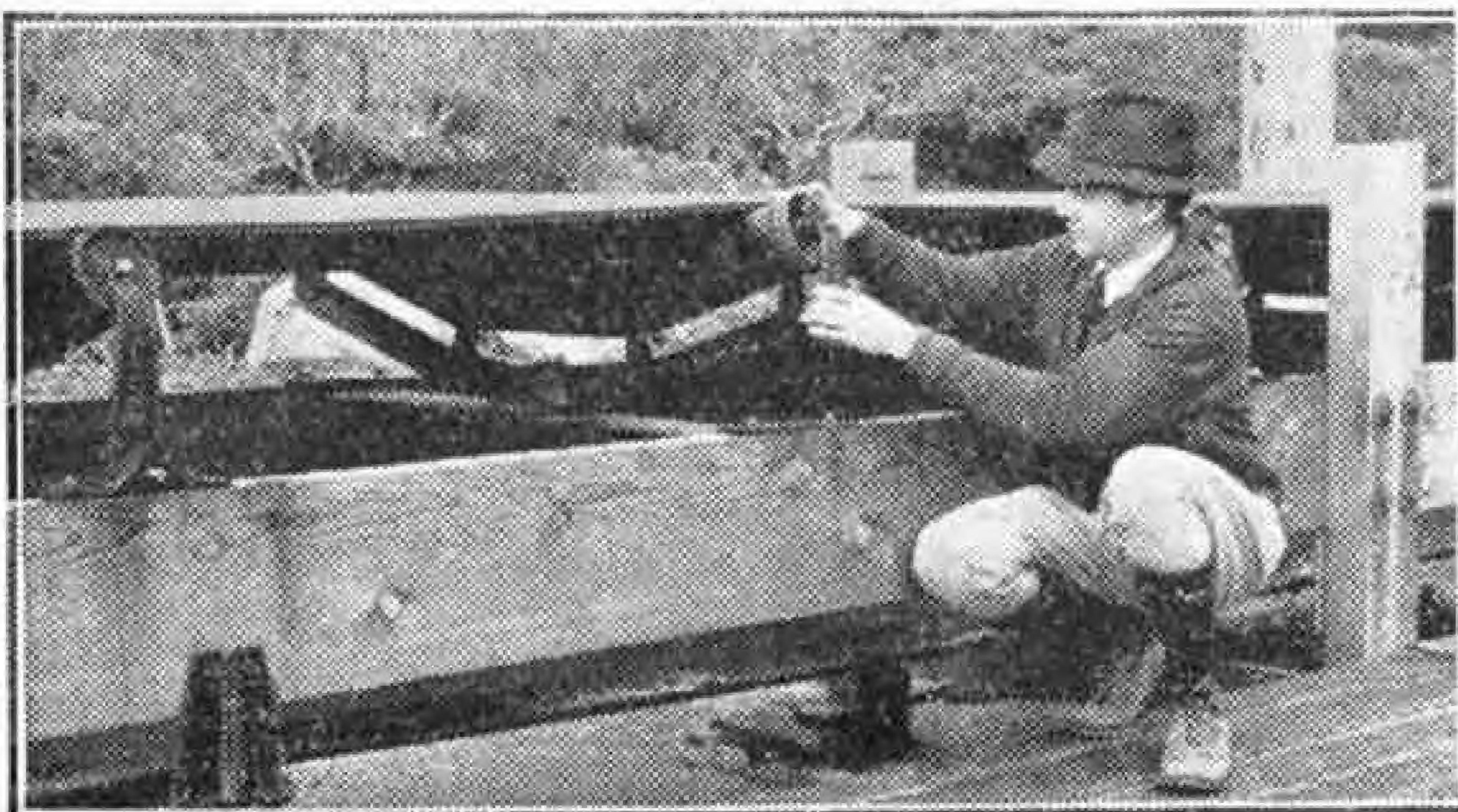
Transporting stones on the conveyor.

the sizes required. The smaller gravel is crushed to form sand, three grades of which are stored and combined in the correct proportions when required.

The various gravels and the blended sand are picked up when needed and passed over automatic scales on to the great conveyor, to begin the journey across the hills, rivers and roads and down into the Sacramento River canyon. One type of material at a time is conveyed, and the long journey of 10 miles on the succession of travelling belts occupies 1 hr. 40 min. The swift movement continues night and day so that the great mixers and pourers are never short of work. At night the conveyor is illuminated by sodium vapour lamps, and only in rainy weather is any covering used for any part of the system.

This record conveyor has 16,000 troughs and return belt rollers, in making which 18 miles of steel tubing and 11 miles of steel shafting were used. The belts themselves required almost 1,000,000 lb. of rubber and more than 1,000 bales of cotton were used in making them.

For the information given in this article and for our illustrations we are indebted to the Bureau of Reclamation, Washington, U.S.A.



A close-up view of the conveyor, showing the training pulleys that maintain the alignment of the belt.

Air News

"Eyes in the Sky"

Like a tiny white fish the "Wellington," "clamped" in a cone of searchlights, pursues its lone, lofty way over its target, a fortified naval base. Flak explodes above and below it.

In the nose of the bomber the observer, stretched full length with the eyes to the bombsight, is floodlit as if on the stage. The light from those brilliant beams glitters on every bright surface, shimmers through Perspex windows, and illumines his tense face. The flashes of shell bursts are blinding, and their roar, close at hand, jars the bomb-aimer's brain. Yet his eyes never move, while, steady and sure he gives directions to the pilot. For those few, long, crucial moments *he* is controlling the aircraft.

"Left, left, Steady. Left, left. Right, a little now. Steady, stead-y. O.K. Bombs gone!"

He has twitched the tail of his "Mickey Mouse." The bombs are on their way down.

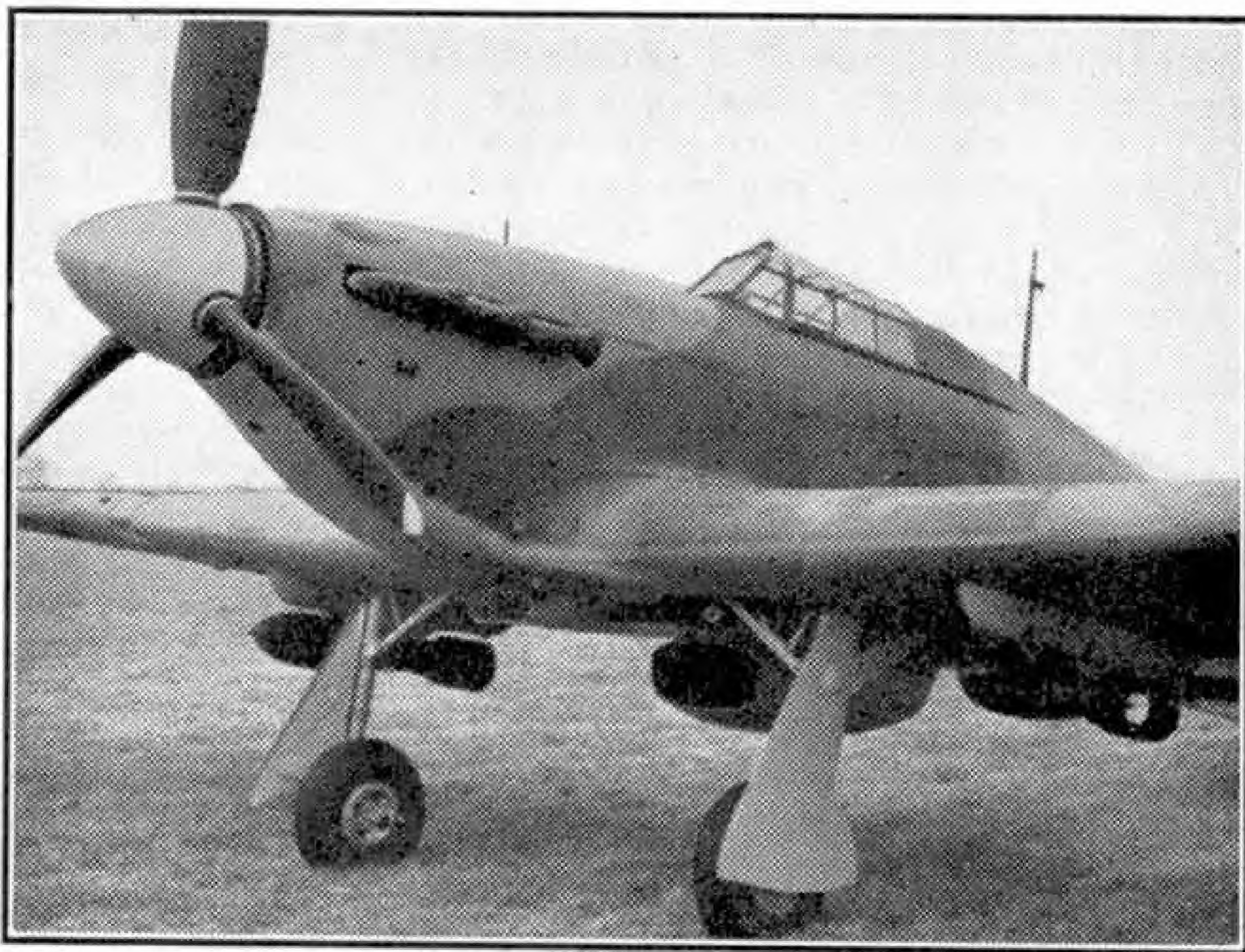
Now, it might be imagined, the job is over; in actual fact, something remains to be done in the very heart of danger. For what seems to the rest of the crew an interminable nerve-racking period the captain holds straight on his course, despite the keen searchlights and shell-blasts which rock the "Wellington" madly. In the dark fuselage his second pilot waits, counting, his eyes on a stop-watch. Down the flarechute beside him he suddenly thrusts a heavy, cylindrical object, so icy cold at this height that the flesh would be torn from his hands if they were not protected by thick leather gloves.

Those on the ground are aware of a blinding flash. The bomber's crew, cursing gently—after all, their primary duty is to reach the target and drop bombs—behold

glittering water, port buildings, and other less certain shapes in the moment's dazzling brilliance. Then darkness shuts all away. The photograph has been taken. Gratefully they veer homeward.

Safe back at base the "Wellington" rolls to a halt, in the early dawn of a brisk winter morning. The ground crew are waiting. An N.C.O. jumps from his bicycle and runs to take the exposed negative from the bomber's battle-scarred hull.

Not so very long afterwards in a room labelled "INTELLIGENCE," two officers are poring over a photograph spread on a table. "No doubt about it," says one. "The destroyers were anchored here and here in the last picture we had. Let me see, that's the one dated two days ago.

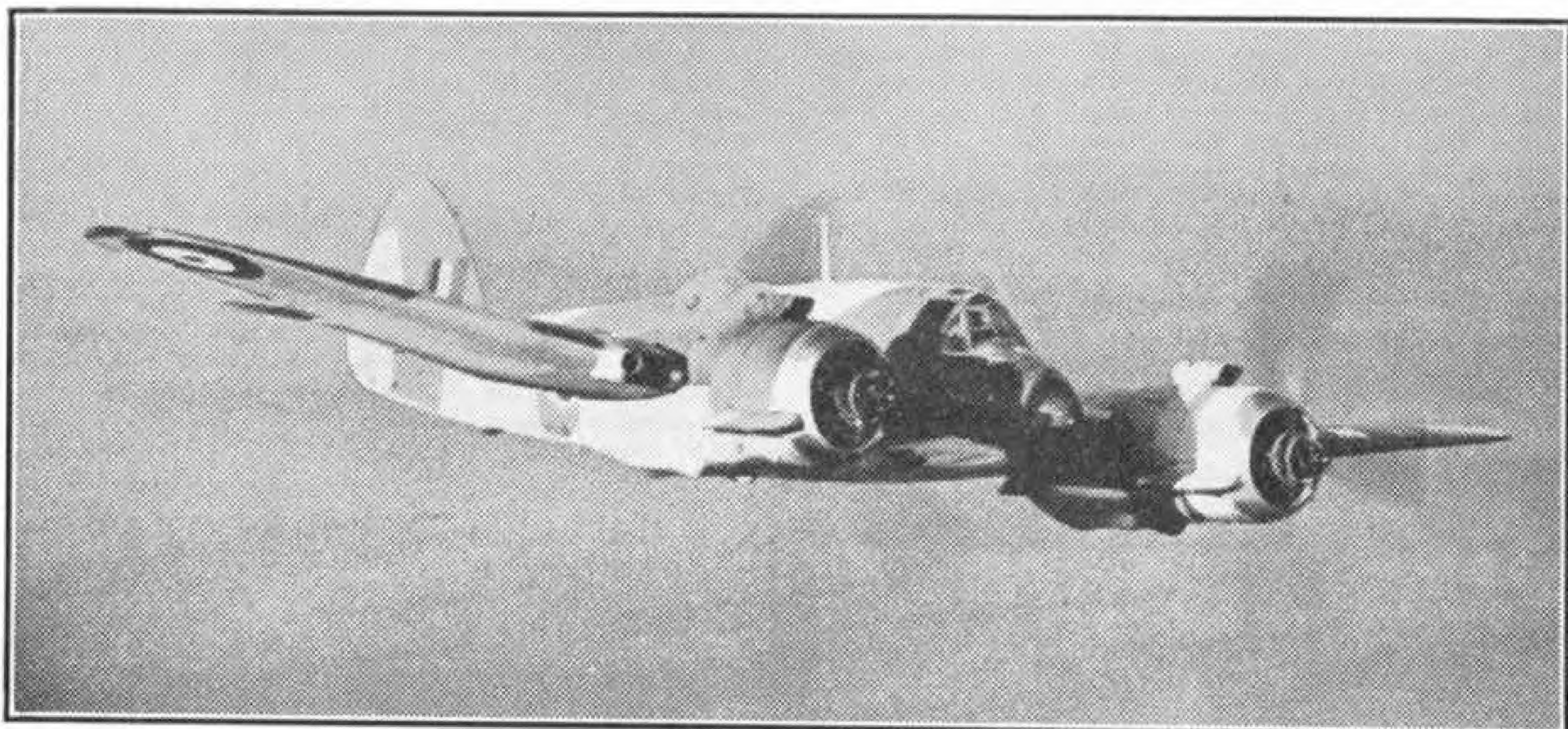


The bomber version of the famous Hawker "Hurricane" fighter. Photograph by courtesy of Hawker Aircraft Ltd.

Now they've up-anchored and gone. The Navy must know about this." He reaches out for a telephone. Those few extra moments of tension endured by the bomber's crew will be worth even more to their country than the whole squadron's effort that night.

* * * *

The Royal Air Force have agreed to release some of their American-built Vultee "Vanguard," to meet the Chinese Air Force's great need for fast, high-flying fighters.



"Bristol" Beaufighter, another British fighter type that is giving splendid service with the R.A.F. Photograph by courtesy of Bristol Aeroplane Co. Ltd.

British Airways News

British Airways' Boeing flying boat "*Berwick*" recently flew from Belem to Puerto Rico, a distance of about 3,000 miles, in a little over 24 hrs.

The Company's Empire flying boat "*Cassiopeia*" was lost on 29th December last year, when it crashed and sank while taking off at Sabang, Netherlands East Indies. Four of the passengers were drowned.

The recently-acquired Curtiss C.W.20 air liner, the largest twin-engined transport in the world, has been delivered to British Airways. It is named "*St. Louis*." An article on this machine will appear in an early issue.

Air Surveys of Canadian Forests

One of the happier uses of aircraft is for carrying out aerial surveys of large forest areas, and in Canada air photographs now play an important part in the administration and conservation of the country's great forest resources. According to a recent note in the C.P.R. publication "*Agricultural and Industrial Progress in Canada*," slightly more than $\frac{1}{4}$ of the total area of the country, or 950,000 square miles, has been photographed from the air, largely by peacetime operations of the Royal Canadian Air Force. The Dominion Forest Service now has on hand forest maps prepared from these photographs covering 113,000 square miles, including 19,000 square miles on which timber estimates are shown in addition to the usual demarcations of forest types.

Making a forest survey or taking an

inventory of timber stands on the ground is an arduous and expensive job, but by using aircraft practically every locality is made readily accessible for observation and photographing. From air photographs good maps can be supplied in a small fraction of the time and at much less than the cost of ground surveys. Some idea of the value of this new method can be gained by bearing in mind that an area of two or three hundred square miles, necessitating a whole season's work by foresters in the field, can be surveyed by the aerial camera in the course of a few hours.

From air photographs it has been found possible to classify forest types, and methods of determining the heights of trees have been developed by measuring their images or shadows in the photographs, which, with the density of the forest, provides the basis for surprisingly accurate estimates of the volume of standing timber.

Free French Squadron in Britain

A Free French air squadron formed in this country is equipped with the four-cannon type of "Hurricane" fighter, and has accomplished fine work in attacks upon enemy shipping and invasion ports. Films taken during some of these operations were shown to General de Gaulle when he inspected the squadron.

* * * *

The opening of the Quebec Bombing and Gunnery School at Montjoli, Canada, on 15th December 1941, completed the Empire Air Training Scheme establishments several months ahead of schedule. The Scheme now includes 93 training schools, 130 auxiliary establishments and 100 aerodromes.

Air Reconnaissance in Arctic Circle

Much has been heard about the fine work being done by air crews of the R.A.F. Coastal Command in their extensive reconnaissance patrols over the waters around Great Britain. They have other duties in addition to keeping a constant watch for enemy shipping, submarines, and aircraft. A unit of this Command stationed in Iceland also looks out for icebergs, ice-floes, and pack-ice, and reports them.

Over Germany in Cowboy Boots

When a tall, lanky American from Texas who is now a tail gunner in a "Halifax" of the R.A.F. Bomber Command, takes part in attacks on Germany, he wears elegantly-designed cowboy boots instead of the regulation flying boots.

"They're the most comfortable boots you can get,

Authority. The airport is only $3\frac{1}{2}$ miles from the centre of the city and is 729 acres in extent, of which just under 560 acres form the landing field. The four runways range from 4,100 ft. to 6,855 ft. in length, the longest being the North-South one, which is laid down in the direction of the prevailing wind. This runway is equipped for blind landing from the South end.

The seven hangars are very roomy, and the largest one has a doorway 283 ft. wide and a height clearance of 45 ft., sufficient to admit the largest aeroplane in the world, the Boeing B-19 bomber. The terminal building is a huge structure erected on pile foundations, and one of its most striking features is the observation window in the passengers' waiting room. This window forms the east wall of the room and is 200 ft. long and 25 ft. high, and faces the landing field.

Carrying Aircraft Inside Aircraft

Italy has solved the problem of transporting fighter aircraft to areas of operations beyond their range by carrying them, partly dismantled, inside large machines, and Fiat single-seater fighters have been ferried in the roomy fuselage of Savoia-Marchetti S.M. 82s. The work is done by a special Italian air service, and personnel and other equipment also are carried by the service.

The Enemy Wave a Greeting

The South African lieutenant pilot of a "Maryland" bomber, who comes from Johannesburg, and his crew, had been attacking heavily laden Junkers Ju 52s over the Mediterranean when their machine was struck by cannon shells. One engine was put out of action and the cockpit was flooded with petrol.

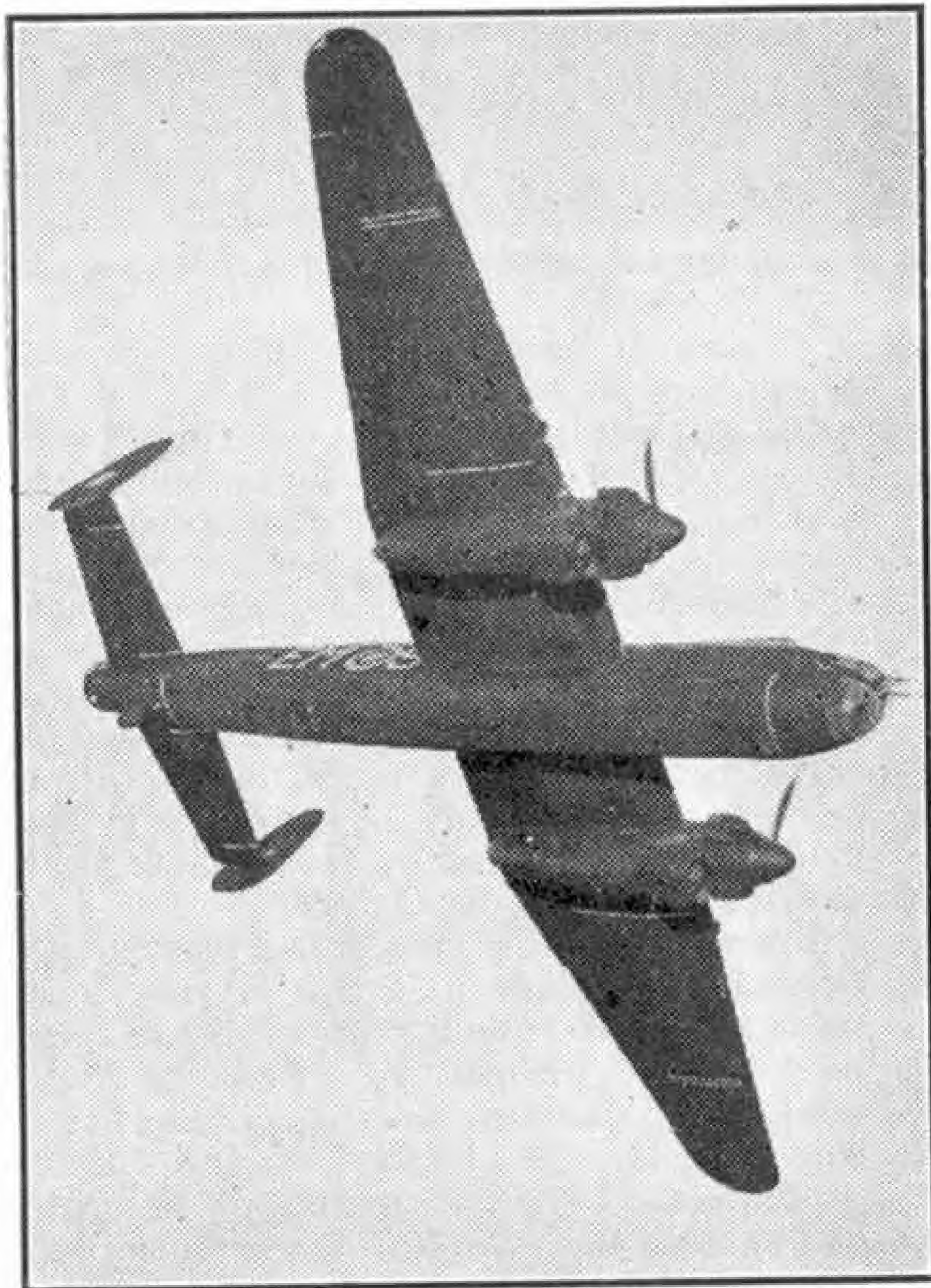
"I thought for a moment that we were on fire," said the pilot. "My fears were unfounded, but one engine cut out, and I made up my mind to make for the African shore at a point which I knew was occupied by the enemy. Ten miles inland on coming over a rise I found we were passing between two enemy aerodromes. A few minutes later we were 10 ft. over the heads of two large concentrations of enemy troops. Some of them waved in friendly greetings as we came rushing over them. Then they realised they had made a mistake, and they started shooting at us with rifles and revolvers. I continued to fly into the desert in the hope of escaping on my one engine."

After a worrying flight of 340 miles the pilot arrived over his home aerodrome. Then he found that the hydraulic system of the "Maryland" had been damaged, and that he could not lower the undercarriage properly. Somehow he managed to get the machine down, however, and all the four members of the crew stepped out unhurt.

United States Balloon Barrages

The balloon barrage is a familiar sight in many parts of Great Britain, and now that the United States is in the war much attention is being given there to this important method of protecting vital industrial and other centres against low level attack by enemy raiders. Information on the subject supplied by Britain has been studied thoroughly by the U.S. War Department, and steps are being taken to establish balloon barrages at all vital points in the United States. The balloon units are being manned by specially trained crews, and the first barrage balloon training school in that country was opened last summer.

According to reports from Ottawa the National Steel Car Company, of Toronto, have been given a large order for Avro "Lancaster" 4-engined bombers. The Canadian Car and Foundry Company's plant at Fort William, Ont., and those of the Associated Aircraft Company at Toronto, also are to be engaged on "Lancaster" work. This machine is said to bear some resemblance to the twin-engined Avro "Manchester."



A fine flight photograph of an Avro "Manchester" bomber.
Photograph by courtesy of "Flight."

and no kiddin," he says, when the rest of the crew chaff him about his unusual footwear. The boots come high above the ankles, have a gay design of inlaid coloured leather, and high heels. At least, the heels used to be high; now they have worn low from constant use, and the leather tops are losing their colour. "You see, I've worn them ever since I came to England in June, and before that when I was training in Canada," he says. "I'm just waiting for my father to send me another pair."

His home is in Corpus Christi, Texas, and he was a student at the Agricultural and Mechanical College of that State before he joined the Royal Canadian Air Force in September 1940.

Fine New Airport at Washington

The recently opened National Airport at Washington is the first of its kind in the United States to be owned and operated by the Government of that country, and is directly in charge of the Civil Aeronautics

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, we can supply copies of these books to readers who cannot obtain them through the usual channels. Order from Book Dept., Meccano Limited, Binns Road, Liverpool 13, adding 1/- for postage to the price. Postage on different books varies, but any balance remaining will be refunded.

"BOMBERS"

By C. G. GREY (Faber & Faber. 6/- net)

After Mr. Grey's *"British Fighter Planes"* this bomber survey just had to come, and good as was the first book the second is even better. I feel that "C.G.G." was in higher spirits when he wrote this book; now and then he even bursts forth, not indeed into song, but into poetic extracts ranging from Solomon to Kipling by way of Milton. For more than thirty years he has been in intimate contact with aviation and with the men who have made it, and he pours out his recollections in a joyous stream, with many flashes of humour and an occasional bite at incompetence.

The book is in four parts. The first deals with bombers and bombing from the early days of flying up to the end of the 1914-18 war, and in passing the author points out that during that war we seemed to make a habit of presenting promptly to the Germans a sample of almost every new type of machine we produced, as the result of unfortunate landings in enemy territory. There follows a review of the activities of the R.A.F. between the Armistice and the present war, and we are reminded of the fact, often overlooked, that the experience gained in the "little wars" always going on somewhere or other in the Empire was one of the factors that gave us superiority over the Luftwaffe from the start. Very interesting too is the account of the development of United States bombers during this inter-war period. Part three deals with bombing in the present war. For some months after the outbreak there seemed to be a curious silent agreement on both sides that there should be no bombing of land positions. Our big bombers were sent over German cities night after night to drop pamphlets. The pilots and navigators certainly got some good practice during these peaceful raids, but it is not surprising that the Americans called it a "phoney" war.

The war may be said to have begun in earnest in April 1940 with the German occupation of Denmark and invasion of Norway. Mr. Grey surveys the work of the bombers in the Norwegian campaign, and then deals in succession with the attack on the Lowlands and the collapse of France. After that it was really Germany versus Britain. We are taken briefly but adequately over the period during which our air power grew steadily in strength, with particular reference to the big bombers. An interesting section deals with the night bomber and the answer to it. The author has something to say on the "Bomb Berlin" demand, and points out the need for dealing with the cleverly dispersed German aircraft factories. "Those little dispersal factories," he says, "invented in Germany ten years ago, a system which we did not adopt until our great main factories had been threatened though fortunately not destroyed, should be the 'Target for To-night' and every night."

This brings us to part four entitled "Aerobiographies," which in many ways is the best of all. Here the author takes us behind the scenes. He shows us how each of the great aircraft firms, American as well as British, has grown from small beginnings; and, more fascinating still, he introduces

us personally to the men who have brought about these vast developments. The story of each firm is followed by a short specification of its bombers, so far as publication can be allowed.

We are reminded of the words of Lieut.-Colonel J. T. C. Moore-Brabazon, Minister of Aircraft Production, when he said that we make bigger and better bombers and fiercer and faster fighters than any other country. To this Mr. Grey adds: "I can only hope that in due course we may build safer and faster aircraft for passengers than any other country, and so may contribute more than any other to the peaceful harmony among the nations."

The illustrations, forty-three of them, are well chosen and excellently reproduced. I have browsed among them with great contentment.

Make a note of this book, "M.M." readers all, and refuse to be happy till you get it. W. H. M.

Owing to wartime difficulties, it is impossible to guarantee prompt delivery of books ordered as described at the head of this page, but every effort will be made to ensure speedy despatch.

"THE SEA FALCON"

By ERROLL COLLINS

(Lutterworth Press. 5/- net)

Mr. Collins has written a really stirring story of war in the air. It deals with the adventures of Barry Falconer, a British air ace who escapes into the mists of the North Sea when falsely accused of being a spy. There he changes

places with a dead German flyer, a trick that enables him to discover a secret Nazi refuelling and ammunition base. He foils the schemes of the enemy and at the same time learns that his disgrace was due to a German spy posing as an R.A.F. officer at his former base. How he tracks down his accuser gives the author opportunities for thrilling tales of duels on land and in the air.

There is a fine R.A.F. atmosphere about the story in which the thrills persist to the very end, when there comes a dramatic meeting between Falconer and his accuser, the real spy, which ends in the destruction of the latter as he attempts to escape. The book is illustrated by a frontispiece.

"BADGES AND EMBLEMS OF THE SERVICES"

and

"LET ME ASK YOU"

By S. C. JOHNSON

(N.A.G. Press Ltd. 6d. each)

These booklets are of extraordinary interest and value, especially in wartime. The first explains the meaning and purpose of rank and regimental badges, and then gives 346 illustrations of service badges and emblems, together with 134 brief histories of the units concerned. The marks of rank of the Army, Navy and Air Force also are illustrated, and a very full index enables any one of these items to be traced without fail.

"Let Me Ask You" is one of the "quizzes" that are now so popular. Altogether there are 350 questions, arranged in sets with answers on the opposite page, and all concern life in wartime. They deal with political and military matters in large variety, food and clothing rations, air raid precautions and the meaning of the many familiar sets of initials such as E.N.S.A. and N.A.A.F.I. Very few readers will know the answers to all the questions asked, but by testing themselves they will acquire a valuable store of exact knowledge in an interesting manner.

Engineering News

Torpedoes Now Being Produced in a Former Boot Factory

The swing over of factories in this country from their peacetime activities to the manufacture of war-making materials has resulted in some remarkable examples of adaptability. One of the best illustrations of this is the fact that torpedoes are now among the products of what was in peacetime a boot and shoe factory. In another factory machines that normally turned out hairpins are now producing thousands of parts for aeroplane engines, while aero frames are coming from a former toy factory. In most cases it will be quite easy for all these factories to revert to their normal work when peace returns.

Giant Magnets

A huge electro-magnet, which was rated to lift a load of 18 tons but actually has lifted loads of 25 tons, has been installed

great plant of the Ford Motor Company at Windsor, Ontario, is being extended by an addition to the foundry building and plant that will almost double the existing steel-casting capacity. A battery of five new electric furnaces and accessory equipment will be installed, and three of the new furnaces will be used for melting alloy steel. The other two furnaces will be holding furnaces, designed also for melting.

A Mountain Tunnel 13½ Miles Long

In order to make use of surplus water from the headwaters of the Colorado River on the western slopes of the Continental Divide in the United States, and divert it to farmlands on the eastern slopes, a great tunnel 13½ miles in length is being driven through the mountains. The tunnel will be the longest in the United States to be driven from two headings. It will be of circular section 9½ ft. in diameter, and in boring it approximately 370,000 cu. yds. of material will have to be excavated.

At its western end the tunnel will connect with Grand Lake by means of a control gate, which will be designed so that water will enter the tunnel at a depth of several feet below the level of the lake. This arrangement is intended to eliminate possible obstruction due to ice.

The tunnel forms part of a great irrigation and power production scheme known as the Colorado-Big Thompson River project. This involves in addition to the tunnel the provision of a great reservoir, which will be formed

by construction of a dam across the Colorado. The project also will include the pumping of water a height of about 130 ft. into Shadow Mountain Lake, and the diversion of the water in Big Thompson River to various points where it will be stored for irrigation purposes and for operating powerful electric generators.



A neat electrically-driven coal lorry. It is supplied with current from storage batteries, and is a product of Metropolitan-Vickers Electrical Co. Ltd., Manchester, to whom we are indebted for our illustration.

at a steel rolling mill in the United States. The manufacturers of the magnet now intend to build larger magnets of a similar type, each of which will be designed with a rated capacity of nearly 75 tons.

More Steel for Great Ford Works

To meet the ever-increasing demand for special steels in Canada's war effort, the

New Type of Motor Life-boat

Construction has begun on the first of a new type of motor life-boat designed by the Royal National Life-boat Institution, and three more boats of the same type are to be built. The new vessels are a development of the powerful Watson cabin-type of life-boat, 46 ft. long, driven by two 40 h.p. Diesel engines, with a speed of over eight knots and able to travel 200 miles at full speed. These new boats will be the first in the Institution's fleet to have the steering wheel amidships, instead of at the stern. They will cost about £10,000 each.

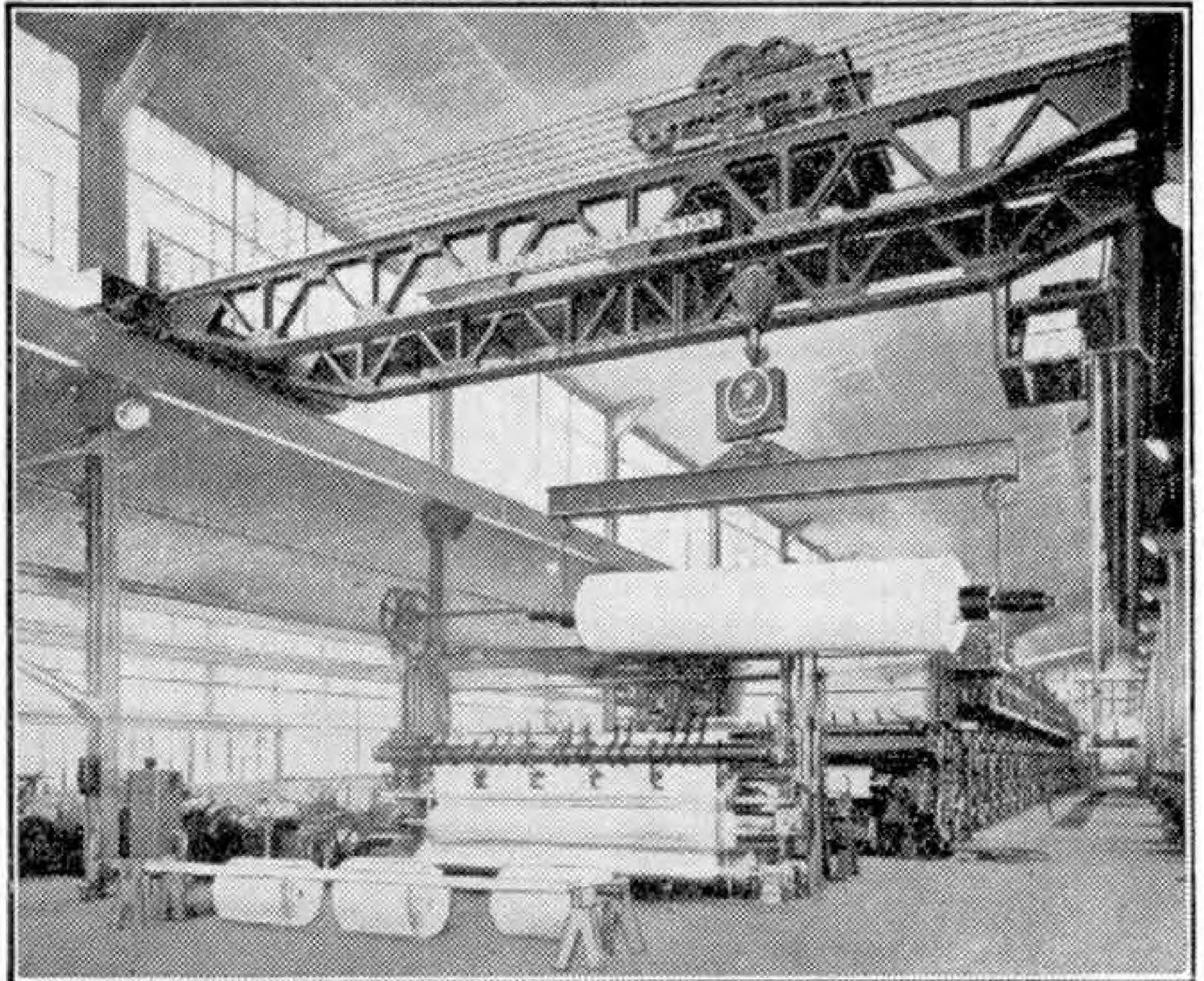
Great Pipeline Now in Service

The great pipeline that American and Canadian engineers have built between Portland, Maine, and Montreal, Quebec, has now been put into service. Some details of the pipe were given on page 348 of the November 1941 "M.M." It is known as the Esso pipeline, and the 236-mile welded steel tube will be able to carry an average of 50,000 barrels of oil per day to the Montreal refineries of Imperial Oil Ltd. The oil will be brought from the South American ports of Venezuela and Colombia by tankers, which will unload their cargoes destined for Eastern Canada at a newly-constructed pier in Portland. The oil will then be driven through the pipe by means of eight pumping stations, about 30 miles apart. These will force the oil along at a rate of some $3\frac{1}{2}$ m.p.h., so that about three days will be occupied for the complete journey to Montreal.

A New Ice-Breaker and Passenger Ship

The Danish State Railway is constructing a new ice-breaker to assist in keeping its services open in winter between Copenhagen and Odense. It will be operated and used exclusively by the railway, to maintain the ferry routes in a navigable condition and to serve as a means of

communication in very severe weather. The new ship will be 203 ft. long and will have a breadth of 53 ft. 8 in. Triple-expansion engines of 6,000 h.p. supplied with steam from four oil-fired boilers will drive three independent screws. A pas-



A 15-ton overhead crane handling giant rolls of paper in the machine room of a paper mill. Photograph by courtesy of The Vaughan Crane Co. Ltd., Manchester.

senger saloon is provided for in the design of the vessel, and this will accommodate about 600 people.

A Novel Warning Device for Motorists

A new idea from the United States is an ingenious device that prevents a careless driver from setting his car in motion while the hand brake is "on."

The device consists of a whistle that is connected to the windshield wiper hose and to the hand brake in such a way that when this brake is set the whistle is held open. As soon as the engine is started the whistle blows, thus warning the driver to release his hand brake before letting in the clutch.

Canada's Newest Bridge

One of the most interesting examples of recent Canadian bridge work is a fine new structure that spans the Welland River and Michigan Central Railroad, near Niagara Falls, Ontario, on the Queen Elizabeth Way. This is a six-lane twin bridge, and its length of nearly 1,000 ft. makes it the longest of its type ever built in Canada. The bridge has 18 spans.

Copper—The Story of the Red Metal

II. Extraction and Alloys

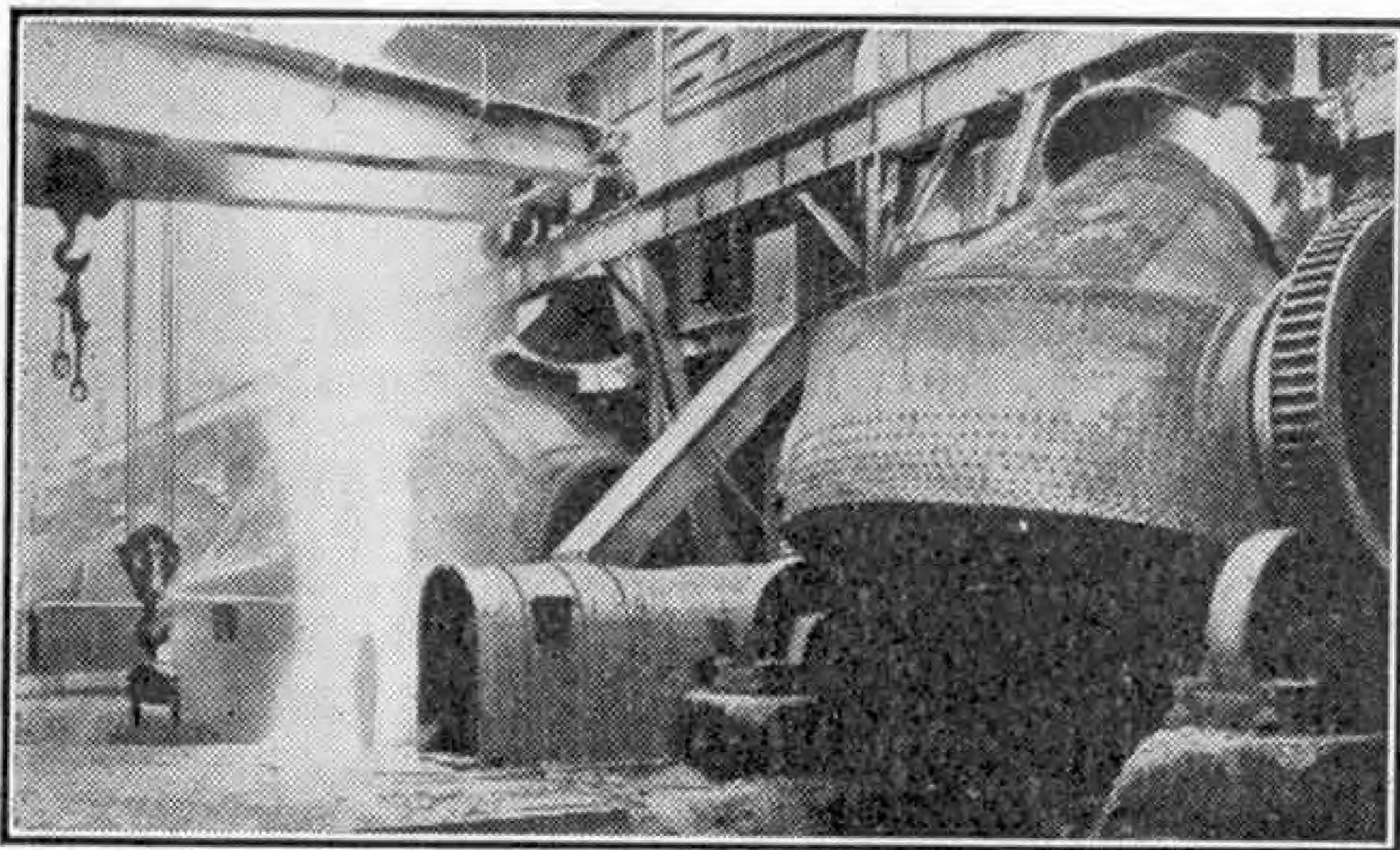
THE chief ores used in the extraction of copper vary greatly in composition, but may be divided roughly into three classes when considering the means to be adopted for obtaining the metal in a pure state.

The first class includes the ores mined near the surface of the ground, such as ruby ore and malachite. These ores are made up largely of metallic copper and oxide or carbonate, with very little iron or sulphur. The second class, found at a lower level, includes ores containing sulphur, such as copper pyrites and purple ore, and those containing both sulphur and iron in various proportions. It is curious that the ore chalcopryite, which

The blast furnace is used for smelting copper ores only if the ore is rich in copper, as otherwise the amount of fuel necessary to perform the smelting operation is so high that it is not profitable to work the ore by this particular method. Where this process is used the ore is charged into the furnace with coal and the necessary slag forming constituents and the combustion of the coal produces carbon monoxide, which reduces the ore to copper which collects at the bottom of the furnace and can be run off.

By far the great majority of copper ores which are used to-day are of the sulphide type and undergo a preliminary process

known as concentration prior to smelting. This is accomplished by flotation methods in which the ore is first ground to fine powder, which is then agitated with the flotation liquid, which separates the actual copper-containing mineral from the gangue. The advantage, of course, is that the further treatment can now be carried out on a material containing about 50% of copper instead of the 2 to 6% of the original ore. The concentrate is then charged into a reverberatory furnace, lime or silica or other



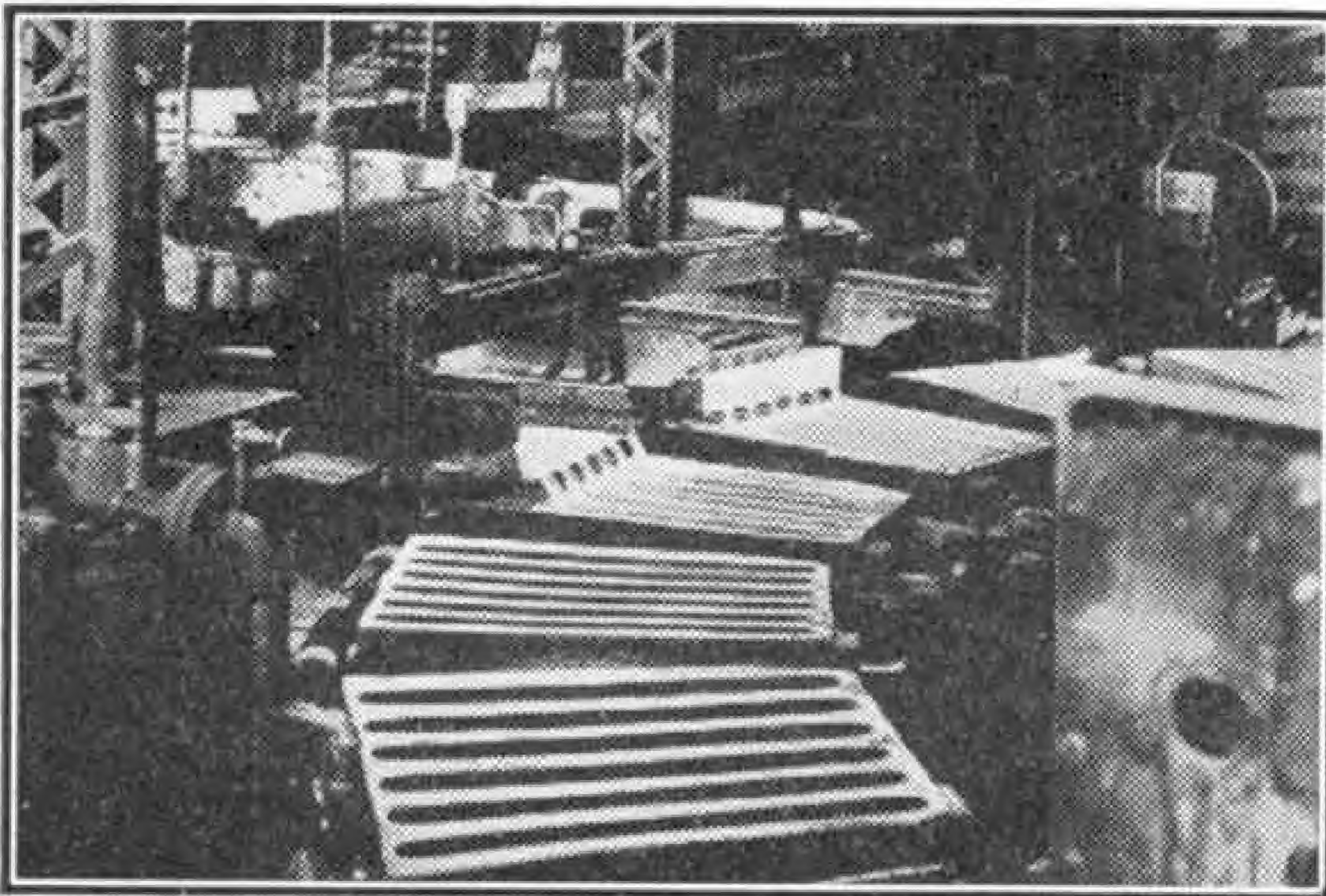
Converters reduce copper matte to blister copper. This photograph and the upper one on the next page show operations by the Anaconda Copper Mining Company, Montana, U.S.A., and are reproduced by courtesy of The British American Metals Co. Ltd., London.

gives the best yield of copper, is almost always found at the bottom of a "lode" or deposit. In the third class are those ores that contain only a small percentage of copper, but which can be worked profitably by cheaper methods so as to obtain copper compounds or even the metal itself.

The presence or absence of sulphur in the ore largely determines the method to be applied in extracting the metal. Most of the copper used throughout the world is got from copper pyrites and chalcopryite, but the removal of sulphur and iron makes the process both difficult and tedious.

slagging material added in the necessary proportions and the whole then heated, generally by means of powdered fuel, to effect the fusion for the production of matte. The molten contents of the furnace consist of two layers; the upper one consisting of slag which is discarded and the lower of copper matte, consisting essentially of a mixture of copper and iron sulphides.

The molten matte is run into a converter, silica added to form a slag and the air blast turned on. The result of the reactions which take place is that molten copper collects at the bottom of the



Casting copper wire bars.

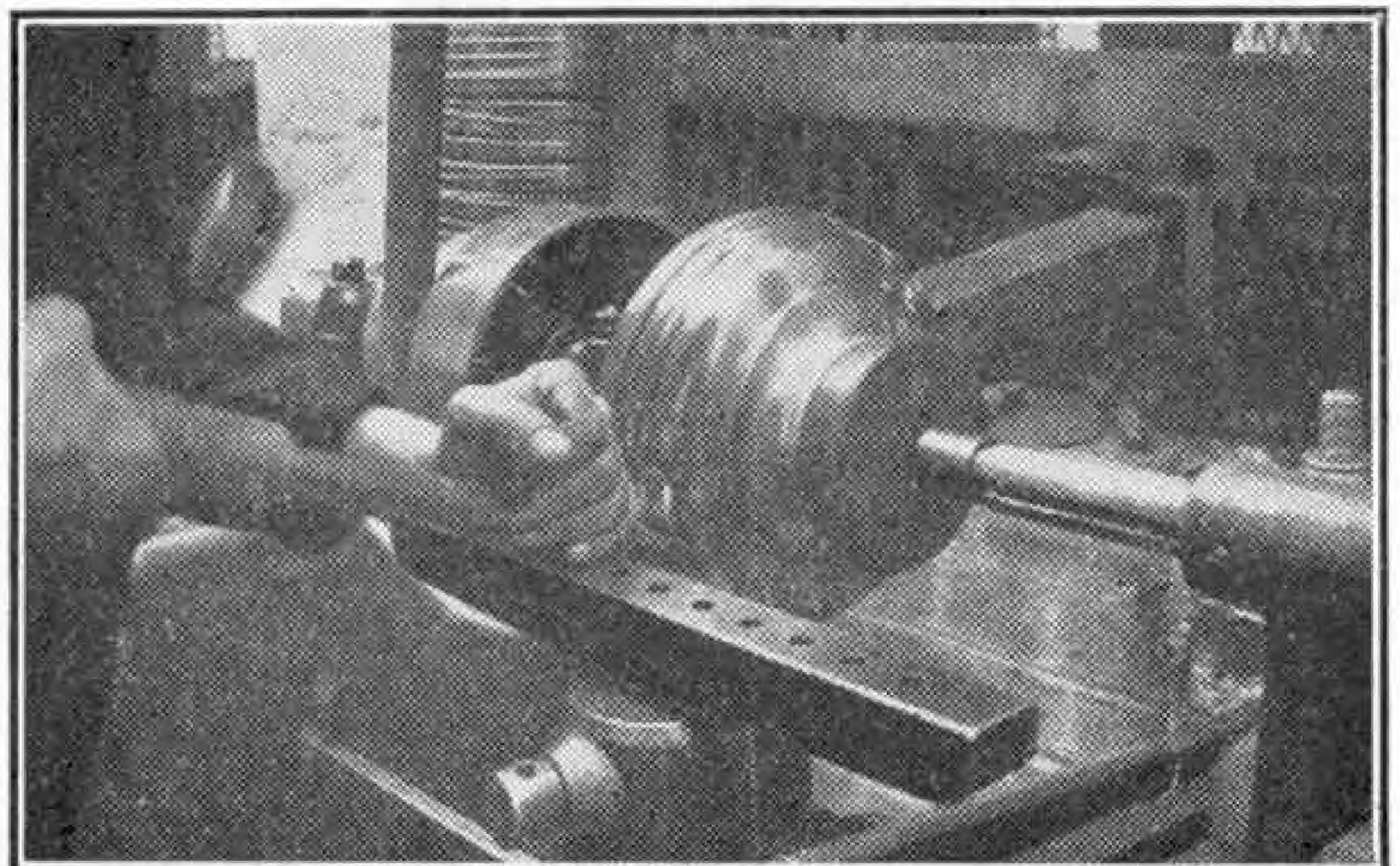
converter and a fusible slag consisting mainly of iron silicate forms the top layer. The molten copper may be run out into moulds and on solidification forms blister copper, or alternatively it may be run direct to the refining furnaces. Blister copper is so named on account of the appearance of the metal, the surface being covered with "blisters" caused by dissolved gases escaping while the metal is solidifying. Further refining is necessary, since blister copper still contains oxide and other impurities. The refining furnace is of the reverberatory type and poles of green wood are forced under the surface of the molten copper so that the oxide which is present can be reduced to metal. Other impurities are removed by volatilisation and the product finally obtained is practically pure copper. It is run out into moulds which are of different shapes, depending upon whether ingots, wire bars or billets are required.

Another method which is used for the final refining of a large proportion of the world's copper at the present day is electrolytic refining. This process is particularly used if the copper contains precious metals such as gold, silver, platinum, etc., which remain with the copper throughout its passage from ore to metal. The electrolytic house consists essentially of a large number of individual cells containing sulphuric acid and copper sulphate in which a cake of impure

copper is made the anode so that when the current is passed, the pure copper builds up on the cathode which is initially a thin sheet of pure copper. The effect of the cell is therefore to transfer the copper from the anode to the cathode and at the same time reject the impurities, including the previous metals, as a slime which collects at the bottom of the cell and is withdrawn for further treatment. The cathodes are an extremely pure form of copper but they are not in a mechanically suitable form for further working processes such as

wire drawing and therefore they are remelted in a furnace and cast into the necessary shapes.

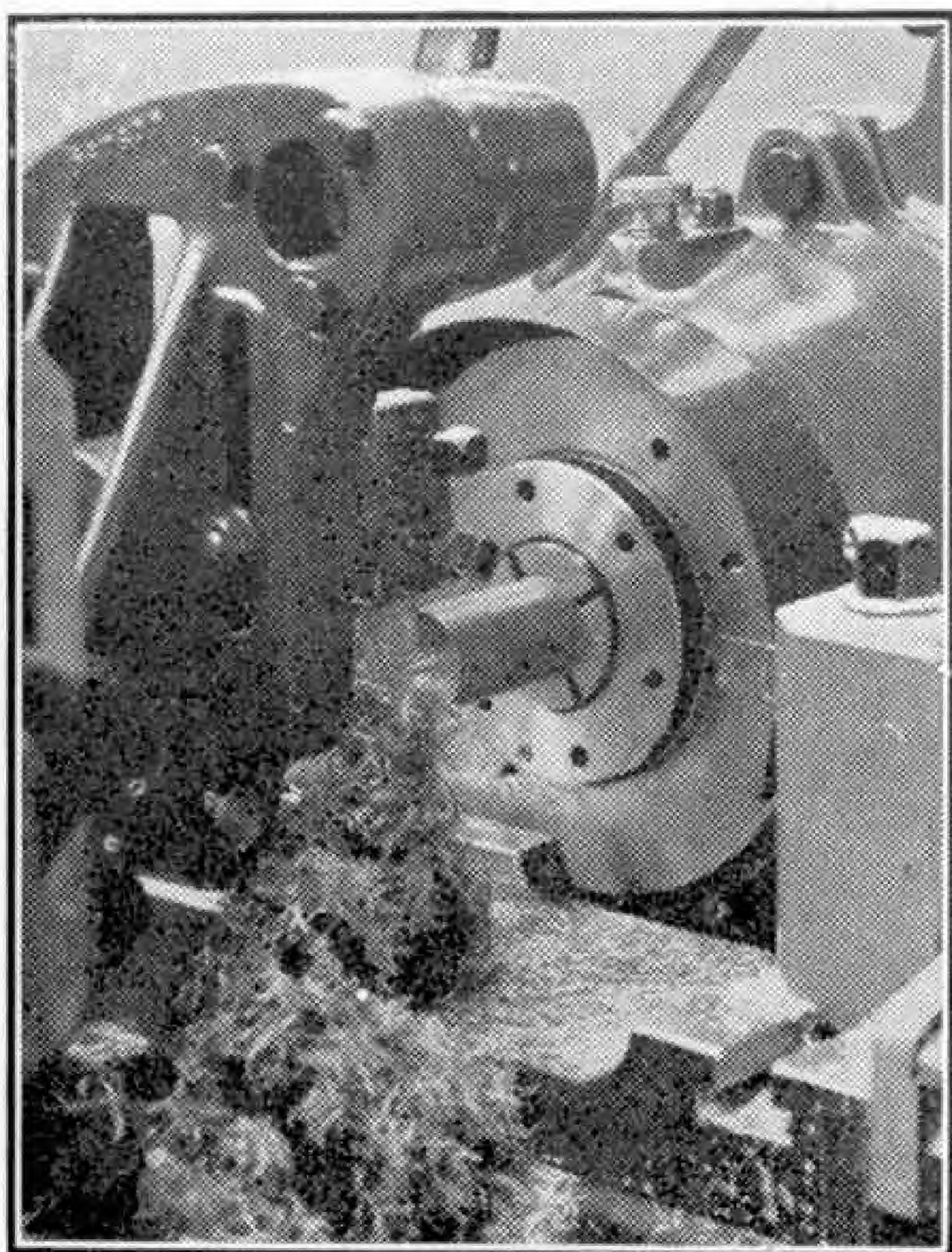
When the percentage of copper in the ore is low, and particularly in the case of oxide ores which it has so far not been found possible to concentrate by flotation methods, another method of extraction is adopted, since the amount of fuel which would be necessary to carry out direct smelting operations on such low grade ore would be prohibitive. The processes are known as wet processes and rely on the extraction of the copper by means of a chemical re-agent which is generally sulphuric acid, which forms a solution of copper sulphate. This solution is then run into electrolytic tanks and the copper precipitated by electrolysis. Some of the older mines build the ore into heaps and allow the action of water and air to



Turning leaded nickel brass ("Silver bronze"). Photograph by courtesy of the Copper Development Association.

transform the sulphide into soluble sulphate, during which the sulphide is oxidised to sulphate, which is then extracted by the water and the dilute copper sulphate solution is then run into tanks containing scrap iron which precipitates the copper in the form known as cement copper. This is an impure form which is, however, sufficiently rich to be directly smelted and refined for pure metal.

Copper is the only red metal. It has exceptionally high conductivity for both heat and electricity, being surpassed in these respects only by silver. It can be rolled into the thinnest sheets or drawn



A typical spinning operation. Photograph by courtesy of Manganese Bronze and Brass Co. Ltd.

into the finest wire, and forging operations can be carried out on either the hot or the cold metal. Under severe conditions of atmospheric corrosion, such as result from complete exposure to the elements, the metal is extremely resistant to attack as compared with the ordinary ferrous metals. This resistance is well illustrated by the many copper and copper alloy implements and other articles that have survived from the Bronze Age. Copper forms a continuous and self-healing oxidised skin on its surface, which, unlike rust on ferrous metals, does not absorb moisture, and offers a high resistance to further attack. A familiar example of the forma-

tion of this protective skin is the green patina often seen on copper roofs.

We have now seen something of the history, mining and extraction of copper, but our account of this metal would not be complete without reference to some of its important alloys.

Brass is an alloy of copper and zinc in various proportions. The word brass occurs fairly frequently in the Bible from the time of Job onward, but it is almost certain that the metal referred to there is bronze. There is no evidence that brass, as we know it, was in use before the time of the Romans. The Romans used a metal called "oricalchum," which apparently possessed the composition and properties of brass, and as the Roman Empire was extended by conquest after conquest, so the knowledge of the art of preparing this alloy spread throughout Europe. In Great Britain the earliest traces of brass occur in the mediæval "brasses" found over the tombs of people who were prominent in the ecclesiastical, military or civil world. Proof that brass was being manufactured in England at the time of Henry VIII is furnished by an Act of Parliament which prohibited the export of the metal under very severe penalties. This prohibition was not withdrawn until 1799. From the time of Queen Elizabeth the production of brass extended steadily and by 1721 it was estimated that the brass industry employed about 30,000 persons.

In the preparation of brass the copper is first melted, the zinc and other ingredients being added afterwards. The surface of the metal is covered with charcoal in order to prevent oxidation, and also to assist in the reduction of the copper oxide which is always found to some small extent in ordinary commercial copper. After the alloy has stood in the furnace for some time it is cast into ingots or moulds. If sheet brass is to be prepared, however, the metal is cast into strips which are passed cold through rolls.

The name brass is used to describe a wide variety of copper-zinc alloys. Alloys of 80 per cent. copper and 20 per cent. zinc, and intermediate compositions containing up to 95 per cent. copper, are generally called "gilding metals," on account of their golden colour. Among the alloys in this class are "Dutch metal," "red brass," "pinchbeck," "toribac," and "Prince's metal." Cartridge brass, 70 per cent. copper and 30 per cent. zinc, is used for cartridge case manufacture, but also for many other purposes. It has high ductility with good (Continued on page 87)

A Fine New Meccano Crane

THE large hammerhead crane described and illustrated on this page is a fine model that Meccano enthusiasts will enjoy building and operating. It is driven by an E1 or E120 Electric Motor, and is easy to construct. There is indeed no need to explain in detail how the tower and boom are constructed, as this can be seen readily from the upper of our two illustrations.

The gear-box used in the model to allow the different

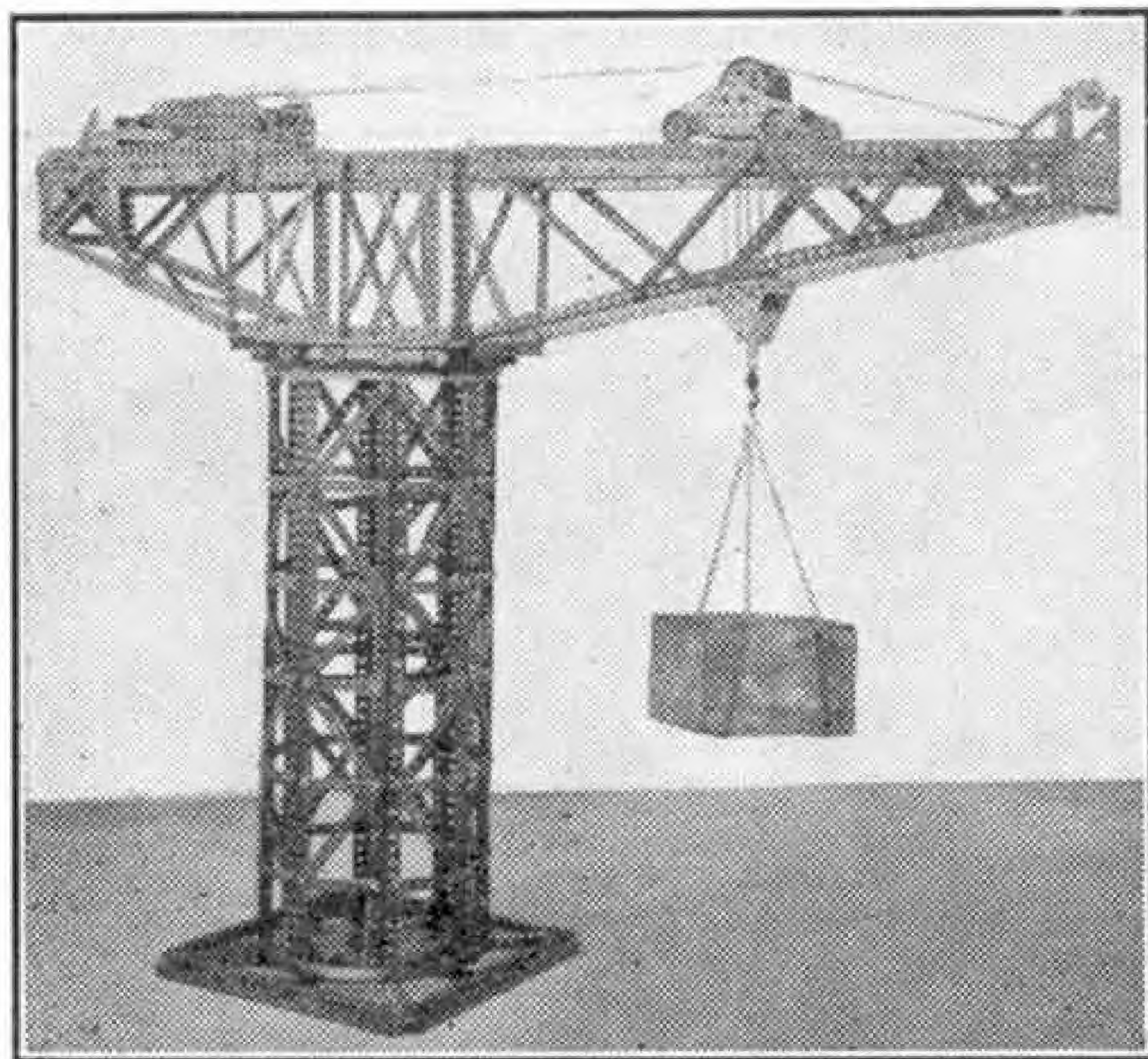


Fig. 1. A fine model hammerhead crane.

movements to be carried out is shown in plan in Fig. 2. The Electric Motor is secured in the position shown and is spaced from the Plates by four washers. A Worm mounted on the armature shaft remains in constant engagement with a $\frac{1}{2} \times \frac{1}{2}$ " Pinion on a $4\frac{1}{2}$ " Rod 1 journaled in 1×1 " Angle Brackets. This Rod is slideable in its bearings and carries the members of the reversing gear, two $\frac{3}{4}$ " Contrates which move in and out of mesh with a $\frac{1}{2} \times \frac{1}{2}$ " Pinion 2.

The reversing lever consists of a 1×1 " Rod carrying a Handrail Support that engages between the bosses of the $\frac{1}{2} \times \frac{1}{2}$ " Pinion and one of the $\frac{3}{4}$ " Contrates. This Rod is fixed on a Collar lock-nutted to a second Collar by means of a $\frac{3}{4}$ " Bolt, a support for the latter being provided by a Handrail Support fixed to the gear-box. A 2×2 " Screwed Rod is locked in the tapped bore of the second Collar and is pivotally attached by a Swivel Bearing to a $4\frac{1}{2}$ " Rod 3. The latter is journaled in 1×1 " Triangular Plates bolted to the Motor sideplates, and carries a Handrail Coupling. A Pendulum Connection 4 bent to the shape shown engages with the 2×2 " Screwed Rod.

Pinion 2 is mounted on a $3\frac{1}{2}$ " Rod 5 that is slideable in its bearings. The selector 6 is formed from a $2\frac{1}{2}$ " Strip lock-nutted to the side of the gear-box, and also to a $5\frac{1}{2}$ " Strip that is pivoted to a Collar fixed on a $1\frac{1}{8}$ " Bolt inserted in the tapped bore of another Collar. The latter is mounted on a 5×5 " Rod that also carries a Collar fitted with a $\frac{3}{4}$ " Bolt, the head of which engages between two Collars on the Rod 5. On moving the selector 6 forward a $\frac{1}{4}$ " Bevel mounted on the Rod 5 meshes with

a similar Bevel mounted on a $3\frac{1}{2}$ " Rod 7. This also carries a $\frac{3}{4}$ " Pinion, which meshes with a 50-teeth Gear on a $3\frac{1}{2}$ " Rod 8. The drive is then transmitted from Rod 8 through a Worm and $\frac{3}{4}$ " Pinion to a vertical $9\frac{1}{2}$ " compound rod consisting of a $4\frac{1}{2}$ " and a 5×5 " Rod joined by a Coupling. The bearing for the lower end of this Rod is provided by a Handrail Support fixed to the boom. A Pinion for Roller Bearing is mounted on the lower end of this Rod and engages with the teeth of the lower race.

By pulling the selector 6 to the rear the drive is transmitted to a $2\frac{1}{2}$ " Rod 9 through a 1×1 " Gear mounted on Rod 5 and a similar Gear on Rod 9. The latter Gear meshes with a further 1×1 " Gear fixed to a $6\frac{1}{2}$ " Rod 10 that is slideable in its bearings. The selector 11 for this Rod is similar to selector 6. A $\frac{1}{2}$ " Pinion on Rod 10 meshes with either a $\frac{1}{2}$ " Pinion 12, or a similar Pinion 13 that are free on a common Rod. The latter is attached by means of a Socket Coupling to a Worm meshed with a $\frac{1}{2}$ " Pinion on a 5×5 " Rod fitted with a 1×1 " Sprocket Wheel 14. The Rod of Pinion 12 also carries a Worm meshed with a 57-teeth Gear on the Rod of the hoisting drum.

Parts required to build model Hammerhead Crane: 6 of No. 1a; 17 of No. 1b; 43 of No. 2; 40 of No. 3; 2 of No. 5; 26 of No. 7; 15 of No. 8; 2 of No. 8a; 14 of No. 8b; 17 of No. 9; 5 of No. 9a; 5 of No. 9b; 2 of No. 9c; 6 of No. 12; 3 of No. 12a; 8 of No. 12b; 2 of No. 14; 4 of No. 15; 8 of No. 15a; 3 of No. 16; 2 of No. 16a; 2 of No. 17; 2 of No. 18b; 7 of No. 20; 4 of No. 20a; 3 of No. 21; 1 of No. 23; 1 of No. 24; 1 of No. 25; 1 of No. 25a; 5 of No. 26; 1 of No. 26a; 1 of No. 27; 1 of No. 27a; 2 of No. 29; 2 of No. 30; 3 of No. 31; 4 of No. 32; 504 of No. 37a; 471 of No. 37b; 152 of No. 38; 2 of No. 40; 3 of No. 48; 4 of No. 48b; 2 of No. 52; 3 of No. 52a; 1 of No. 53a; 1 of No. 57; 1 of No. 57b; 37 of No. 59; 1 of No. 63; 1 of No. 63b; 1 of No. 70; 2 of No. 76; 3 of No. 77; 2 of No. 80c; 1 of No. 81; 2 of No. 94; 2 of No. 96; 1 of No. 100; 8 of No. 103b; 3 of No. 103c; 4 of No. 108; 3 of No. 111; 1 of No. 111a; 9 of No. 111c; 2 of No. 113; 6 of No. 133; 1 of No. 133a; 7 of No. 136; 1 of No. 136a; 8 of No. 139a; 1 of No. 146; 2 of No. 161; 1 of No. 165; 1 of No. 167; 2 of No. 167b; 1 of No. 171; 3 of No. 172; 1 of No. 182; 1 of No. 182a; 1 of No. 216; 7 of Elektron Part No. 1562; 2 of No. 1563; 1 of No. 1566; 7 of No. 1573; 1 E1 or E120 Electric Motor.

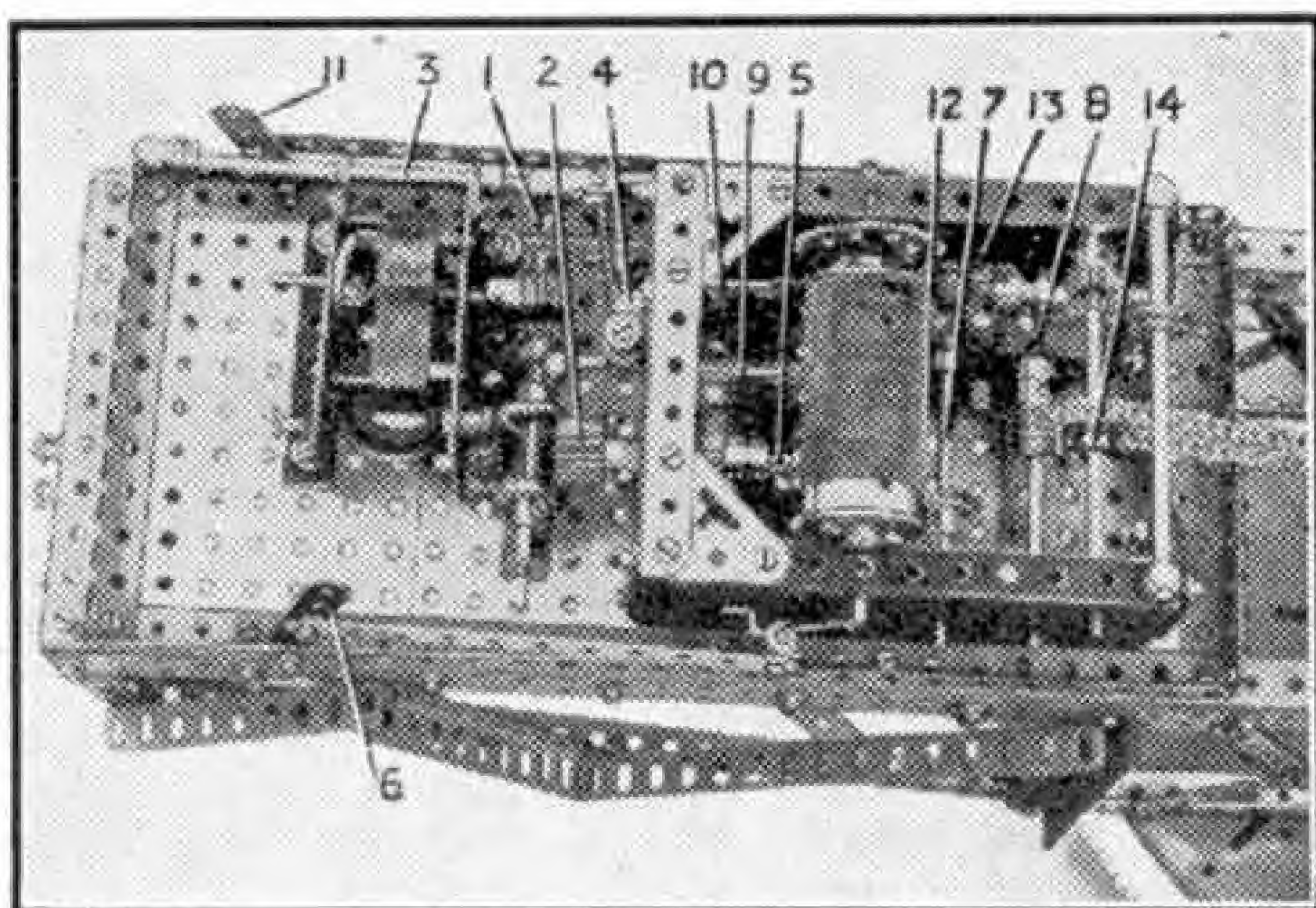


Fig. 2. A plan view of the gear-box of the hammerhead crane

Suggestions Section

By "Spanner"

(536). Ball-and-Socket Joint ("Spanner")

In some models it is necessary to incorporate a ball and socket joint, and although it is not possible to reproduce this device exactly with standard Meccano parts, a close approximation can be obtained, as shown in Fig. 536.

A joint such as that shown will be found quite satisfactory and efficient in operation. The "socket" is represented by a Swivel Bearing 1, while the "ball" is a Collar 2 fixed to the shaft 3. The Swivel Bearing is mounted on a short Rod that is free to turn in bearing 4. Hence the Rod 3, while rotating in the Collar of the bearing 1, can be moved through any angle to the vertical.

(537) A Self-Adjusting Winch ("Spanner")

The most notable feature of the device shown in Fig. 537 lies in the fact that it accommodates itself to variations in the weight of the load, so that a heavy load may be hoisted just as easily as a much lighter one. This is accomplished entirely automatically and in a very simple manner by the employment of an expanding barrel round which the cord is wound.

It will be seen from Fig. 537 that the mechanism consists essentially of a barrel built up from two $2\frac{1}{2}$ " Strips 1, which are mounted on Pivot Bolts inserted in the tapped holes of Collars fixed on the winding shaft 2.

When the winch is engaged in hoisting a light load the barrel is fully expanded under the influence of the springs, but when lifting a heavier load it contracts. In this manner the mechanical advantage of the machine is increased, so that a heavy load may be hoisted with comparative ease.

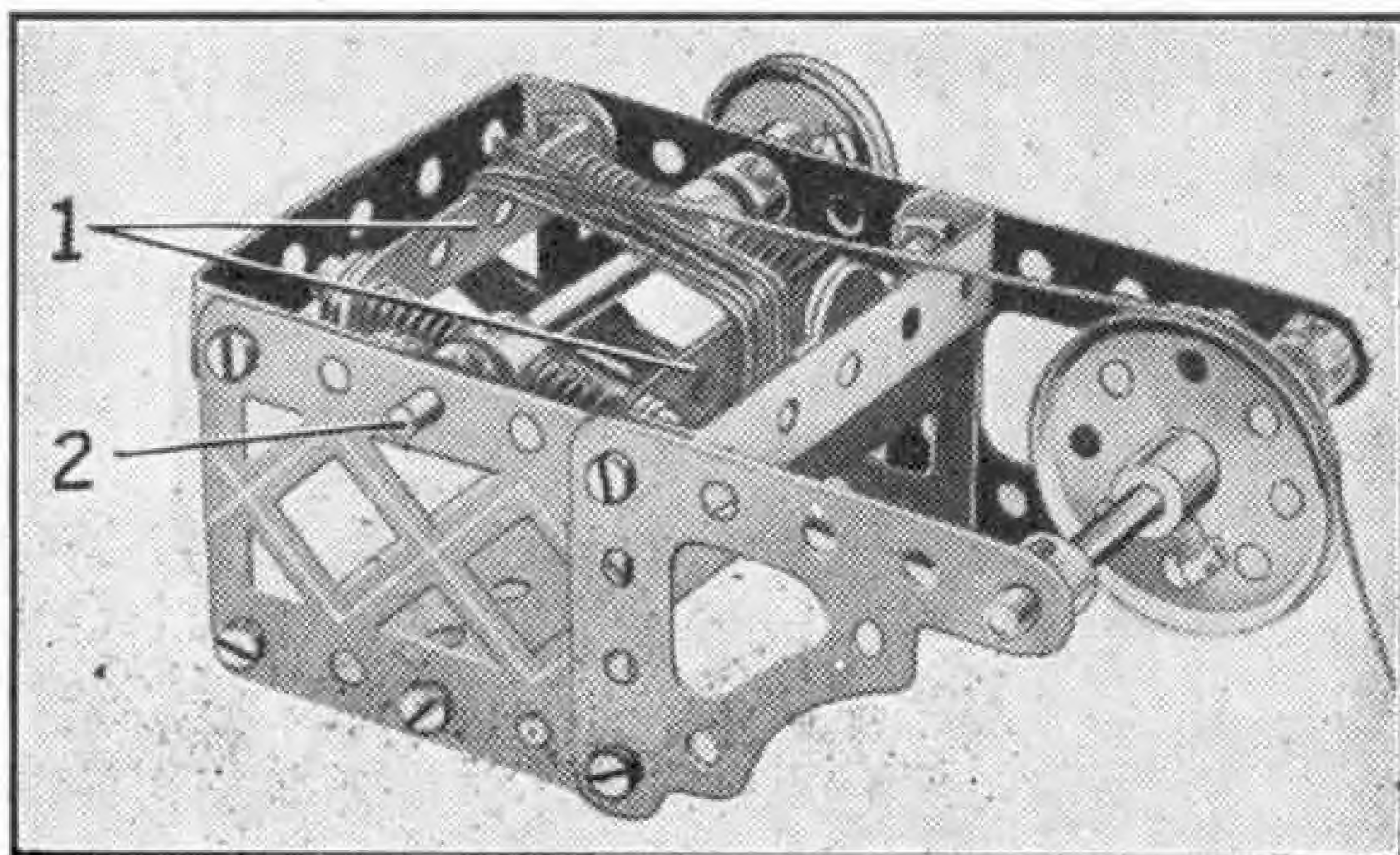


Fig. 537.

Fig. 538 shows a simple method of remote steering for a model car. In the example illustrated the car is a very simple one and is driven by a *Magic* Motor, and it is steered by turning a Steering Wheel held in the hand. The car is first constructed. It consists of two $4\frac{1}{2}$ " Strips, which are spaced apart by a *Magic* Motor at their forward ends, and by a 3" Strip, to which the $4\frac{1}{2}$ " Strips are attached by $\frac{1}{2}$ " \times $\frac{1}{2}$ " Angle Brackets at their rear ends. A $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plate and a Semi-Circular Plate are then bolted at each side to these Strips.

The roof is a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate bent to the required shape and joined to the Semi-Circular Plates by $\frac{1}{2}$ " \times $\frac{1}{2}$ " Angle Brackets. At its front end the roof is supported on $1\frac{1}{2}$ " Strips that are bolted to it and to the sides of the car.

Before the bonnet and radiator are fixed in position the steering gear must be incorporated. This consists of

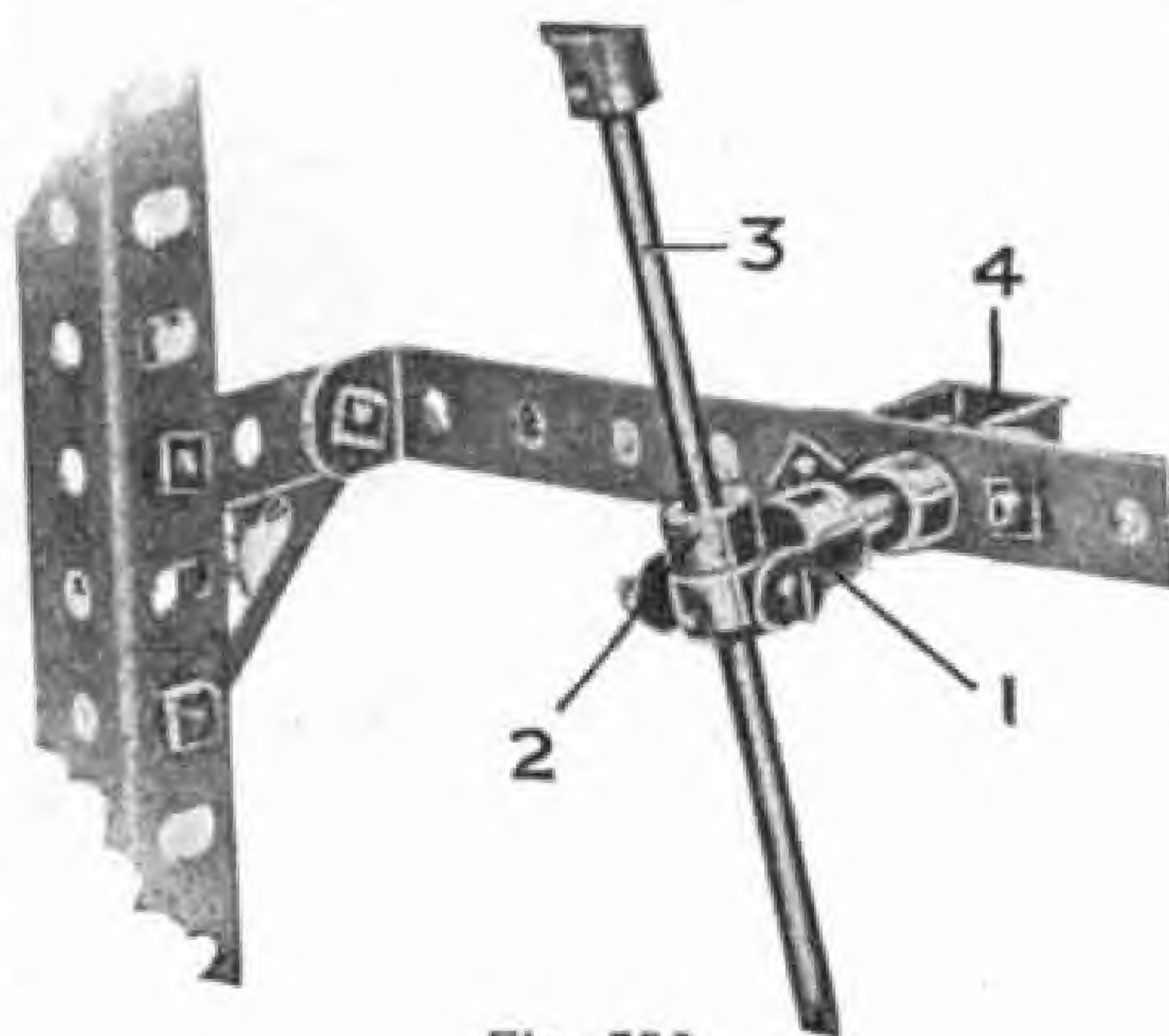


Fig. 536.

a $1\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strip that forms the bearings for a 3" Rod carrying two 1" Pulleys fitted with Motor Tyres. This Double Angle Strip is bolted to a Bush Wheel in which is held a 1" Rod journalled in a $1\frac{1}{2}"$ Corner Bracket that is bolted to

than a few gears, and therefore they have to be content with gear mechanisms of the more simple kinds. It is for their particular benefit that we are describing the simple two-speed reversing gear that is illustrated in Fig. 539.

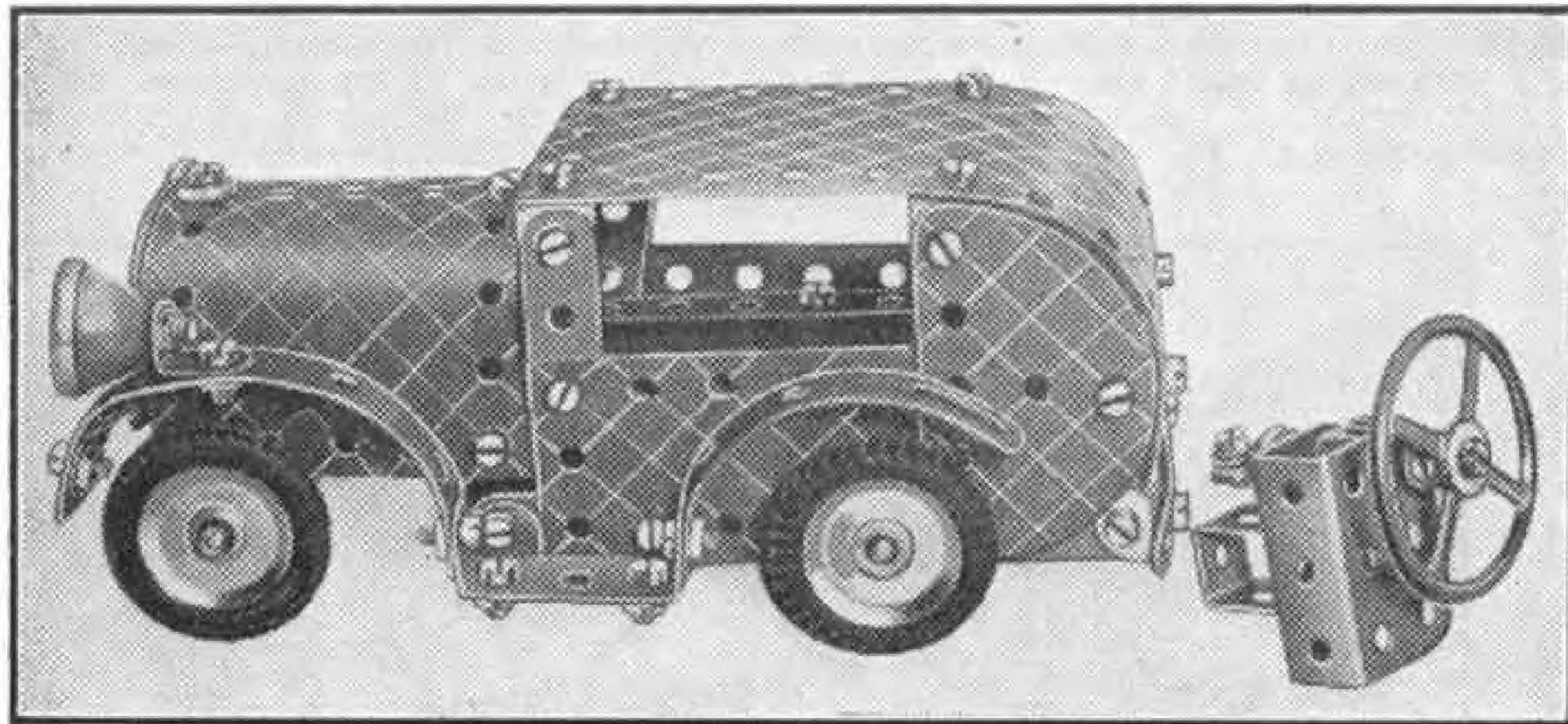


Fig. 538.

two $5\frac{1}{2}"$ Strips. The Rod carries at its upper end an End Bearing, in the arms of which is held a length of tempered steel wire such as Bowden cycle-brake cable. The bonnet, to which the radiator is fixed, is attached to the Strips by $\frac{1}{2}" \times \frac{1}{2}"$ Angle Brackets.

The mudguards and headlamps are now fitted to the model, and the drive from the *Magic Motor* is transmitted to the rear axle by means of a $2\frac{1}{2}"$ Driving Band. The other end of the steering control wire connected to the front axle is attached to an End Bearing mounted on a 1" Rod, which is journalled in a Channel Bearing and carries at its other end the Steering Wheel. Readers will no doubt be able to find other uses for a simple remote control of this kind, for by modifying it slightly it can be adapted to many different kinds of mechanisms.

(539) Two-Speed Reversing Gear ("Spanner")

Most model-builders are interested in gear-boxes, for there is something peculiarly fascinating in these change-speed mechanisms, of which there are hundreds of varieties. Many model-builders indeed seem to spend a large part of their time designing and assembling gear-boxes for different purposes, and for those who possess a large assortment of Meccano gears there is no more interesting and instructive pastime. There are, however, many readers who do not possess more

This mechanism is designed to give a slow forward speed and a rapid reverse motion, or vice versa, and either the Rod 1 or Rod 2 may be used as the driving shaft.

The Rod 2 is capable of sliding in its bearings and is controlled by a suitable hand lever. This Rod carries two Contrate Wheels 4

and 5, which are $\frac{3}{4}"$ and $1\frac{1}{2}"$ in diameter respectively, and on operation of the lever one of these Contrate Wheels is brought into engagement with one of the two $\frac{1}{2}"$ Pinions mounted on the Rod 1. Hence if the Rod 2 is brought into gear with its respective Pinion, the Rod 1 is driven nearly three times as fast as the Rod 2.

If the Contrate Wheel 4 is in mesh, the Rod 1 revolves only a little faster than the driving Rod, the approximate ratio be-

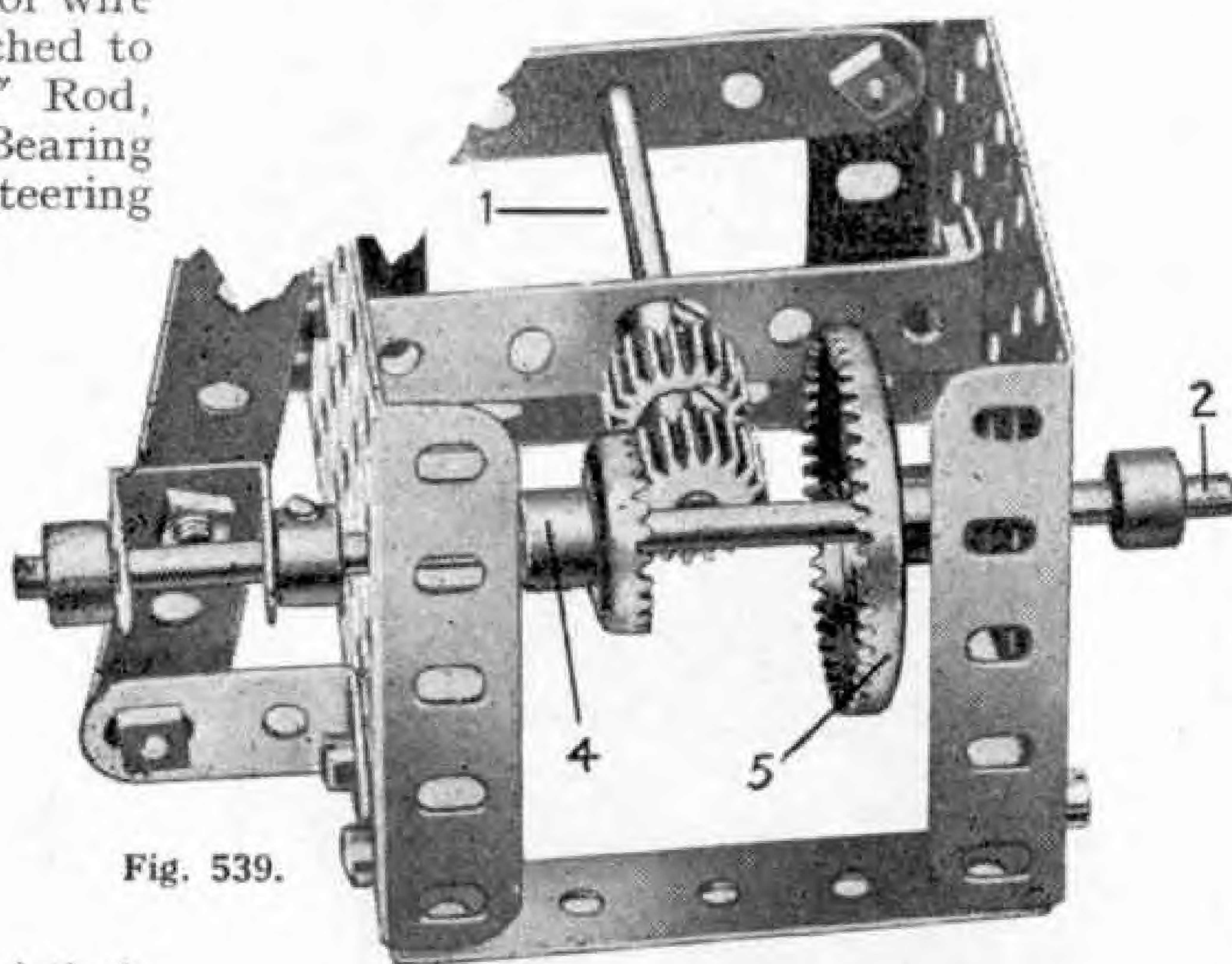


Fig. 539.

tween the two being $1\frac{1}{3}:1$.

If gears on the sliding Rod 2 are required to remain constantly in mesh with gear wheels on a further driving rod, the necessary adjustment may be obtained by mounting upon it a $\frac{1}{2}"$ or $\frac{3}{4}"$ face Pinion.

New Meccano Models

A Tank Wagon and an Amphibian Aeroplane

A REALISTIC model of an oil tank railway wagon that will run on Hornby gauge 0 track is the first of two fine new models described and illustrated this month. It is shown in Fig. 1 and will be found easy to make.

The chassis should first be assembled. For this four Flat Trunnions are bolted to the longer flanges of a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate 1. These form the bearings for the wheel axles which are 3" Rods carrying $1\frac{1}{8}''$ diam. Flanged Wheels. Buffers are then bolted to the front and rear ends of the Plate, and Train Couplings are lock-nutted in the positions shown by means of $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets.

The circular tank consists of a Boiler, complete with Ends. This is attached to the Plate 1, but is spaced from it by a few Washers. It is supported at each side by a Strip bolted to $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets attached to the chassis. The model is completed by fixing a Chimney Adaptor to the top of the tank by means of a $\frac{3}{4}''$ Bolt and Nut.

Parts required to build model Tank Wagon: 2 of No. 4; 2 of No. 5; 6 of No. 12; 2 of No. 16b; 4 of No. 20; 27 of No. 37a; 24 of No. 37b; 10 of No. 38; 1 of No. 52; 4 of No. 59; 1 of No. 111; 2 of No. 111c; 4 of No. 120; 2 of No. 121; 4 of No. 126a; 1 of No. 162; 1 of No. 164.

Our second new model this month is the fine amphibian aeroplane shown in Fig. 2. In making it a $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate 1 is bent to the shape shown and bolted at its upper end to a $4\frac{1}{2}''$ Flanged Sector Plate and a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate at each side of the Sector Plate. Two $5\frac{1}{2}''$ Strips 2 are bent round slightly and attached to the Plate 1. A $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate is then connected to the $2\frac{1}{2}'' \times 1\frac{1}{2}''$

Flexible Plate at each side, to the lower of the $5\frac{1}{2}''$ Strips 2 and to a $4\frac{1}{2}''$ Flanged Sector Plate that forms part of the floor. A Trunnion is bolted to a $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Bracket fixed to the narrower end of the Flanged Sector Plate. The cabin is a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate 3 fixed at its forward end to Flat

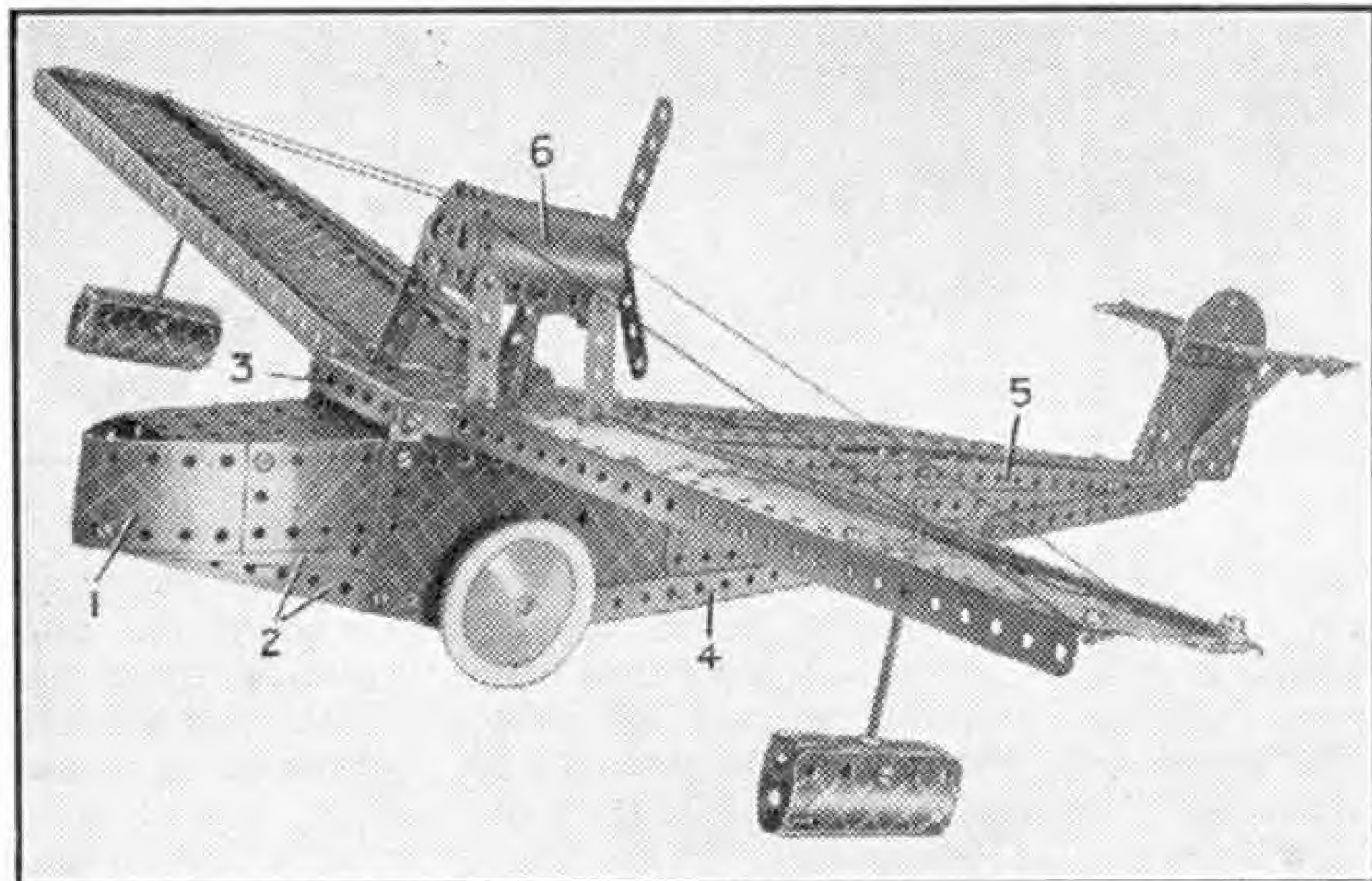


Fig. 2. A model amphibian aeroplane designed for Outfit No. 5.

Brackets attached to the upper Flanged Sector Plate and the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate.

The fuselage is extended at each side by two $12\frac{1}{2}''$ Strips 4 and 5 that are bolted to the lower Flanged Sector Plate and the Flanged Plate 3 respectively. The Strip 4 also is extended by a $5\frac{1}{2}''$ Strip, and the space between the Strips 4 and 5 is filled in by a $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate and a $5\frac{1}{2}''$ Strip. The upper part of the fuselage is formed from a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate that is bolted to the Flanged Plate 3, two $12\frac{1}{2}''$ and three $5\frac{1}{2}''$ Strips.

The engine cowling 6 consists of two large radius Curved Plates overlapped and connected to a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate by four $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets. The engine is supported on four $2\frac{1}{2}''$ Strips, which are bolted together with four $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets to the Flanged Plate 3.

The underside of the fuselage is filled in by a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate, which is attached to the lower Flanged Sector Plate and to a Flat Bracket that carries a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate. A $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate and two $5\frac{1}{2}''$ Strips are attached to the latter Plate, and these are fixed to the sides of the fuselage at their front ends by a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip, and at their rear ends by two $1'' \times 1''$ Angle Brackets.

The $5\frac{1}{2}''$ Strips attached to the Strips 4 are bolted to a Flat Bracket that carries the fin and rudder.

Parts required to build model Amphibian Aeroplane: 10 of No. 1; 13 of No. 2; 2 of No. 3; 10 of No. 5; 2 of No. 8; 8 of No. 10; 2 of No. 11; 11 of No. 12; 2 of No. 12a; 1 of No. 16; 1 of No. 17; 1 of No. 18a; 1 of No. 22; 1 of No. 22a; 2 of No. 35; 91 of No. 37a; 80 of No. 37b; 3 of No. 38; 1 of No. 40; 1 of No. 48; 3 of No. 48a; 1 of No. 51; 1 of No. 52; 2 of No. 54a; 2 of No. 80c; 4 of No. 90a; 2 of No. 111c; 1 of No. 115; 1 of No. 126; 2 of No. 126a; 1 of No. 155a; 1 of No. 186a; 2 of No. 187; 4 of No. 188; 4 of No. 189; 4 of No. 190; 2 of No. 191; 4 of No. 192; 1 of No. 198; 2 of No. 199; 2 of No. 200; 1 of No. 213; 1 of No. 214.

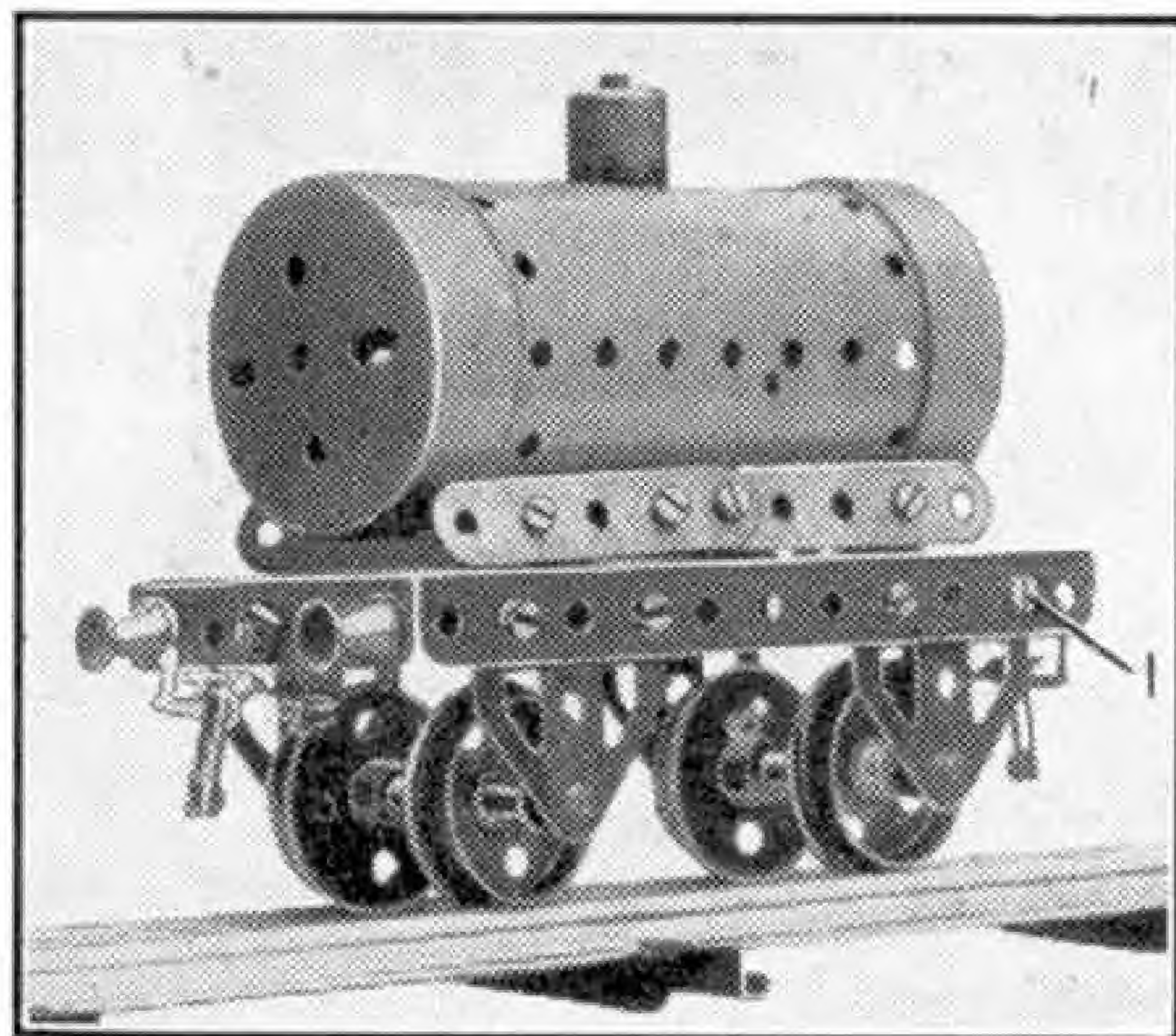


Fig. 1. This tank wagon will run on Hornby gauge 0 track.

Meccano Model-Building Competitions

By "Spanner"

"Autumn" Contest

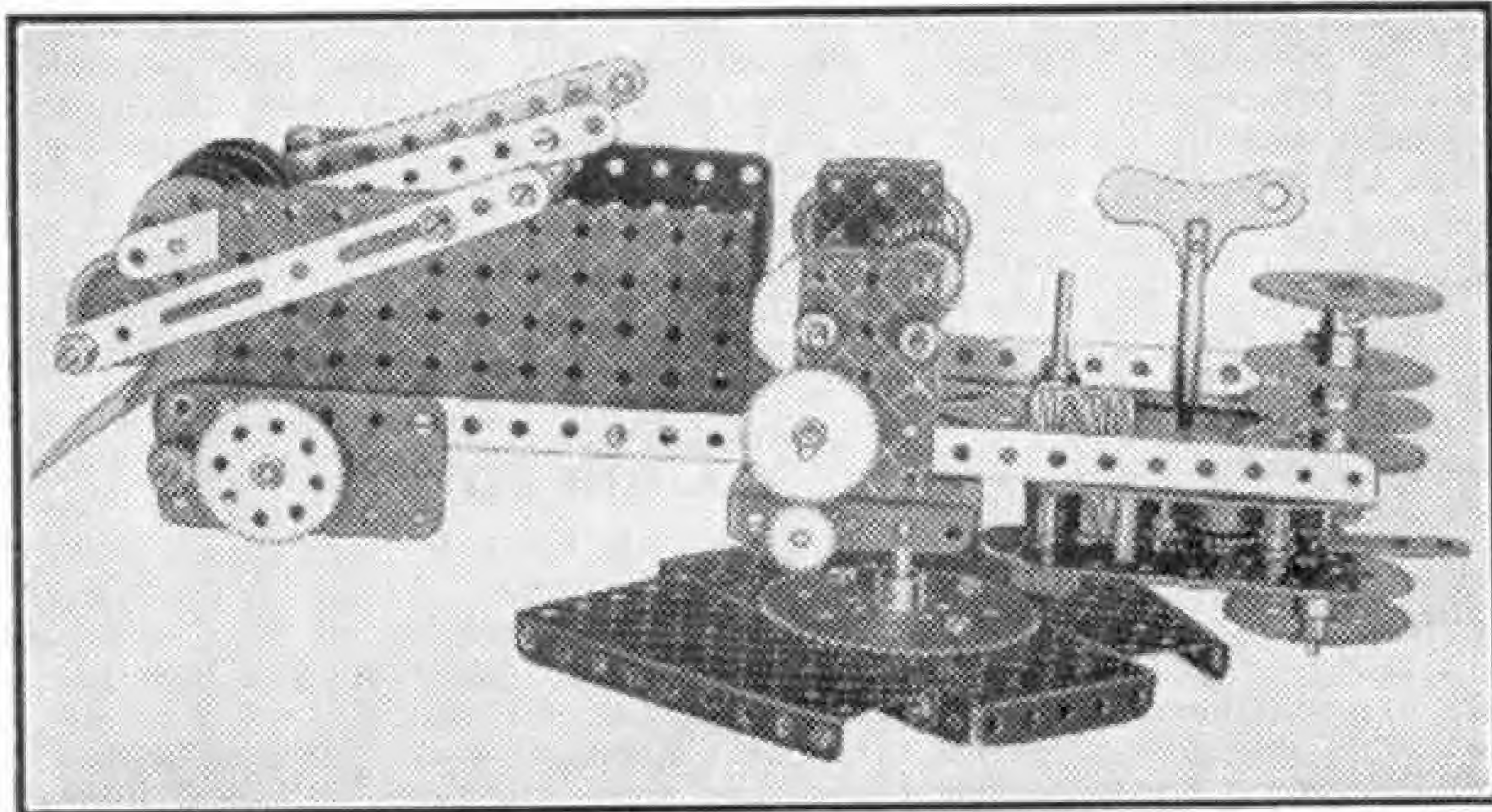
The list of awards in the "Autumn" General Model-building Contest, details of which were announced in the October and November 1941 issues of the "M.M.," is as follows:

Cheque for £2/2/-: H. H. Dowsett, London S.E.24;
2nd, Cheque for £1/1/-: R. W. Hearn, Annesley;
3rd, Postal Order for 10/6: A. Grant, Aberdeen.

Postal Orders for 5/-: J. Matthews, Fillongley, Coventry; L. Kirk, Luton; A. Turner, London E.1;
J. Smith, Teddington; H. Sharpe, Crowborough;
C. Tuck, Manchester; M. Gainsborough-Waring, Shepperton.

Model-builders who entered the "Autumn" Contest concentrated mainly on vehicles of various kinds, but a few decided to base their chances of success on more novel subjects, and one of these heads the list of prize-winners. He is H. H. Dowsett, London S.E.24, and his model is an interesting card-dealing machine that will deal four hands of playing cards in 27 seconds. The machine is driven by a No. 2 Clockwork Motor, and by incorporating a simple braking device in the mechanism it may be used to deal any required number of cards for each hand.

R. W. Hearn, Annesley, was awarded Second Prize for a well-built and realistic model of an E.R.F. semi-streamlined lorry of the forward-control type. A 6-volt Electric Motor forms the power unit, and a four-speed reversing gear-box is a feature of the mechanism. The operation of the model is controlled by gear and brake levers conveniently situated in the cab.

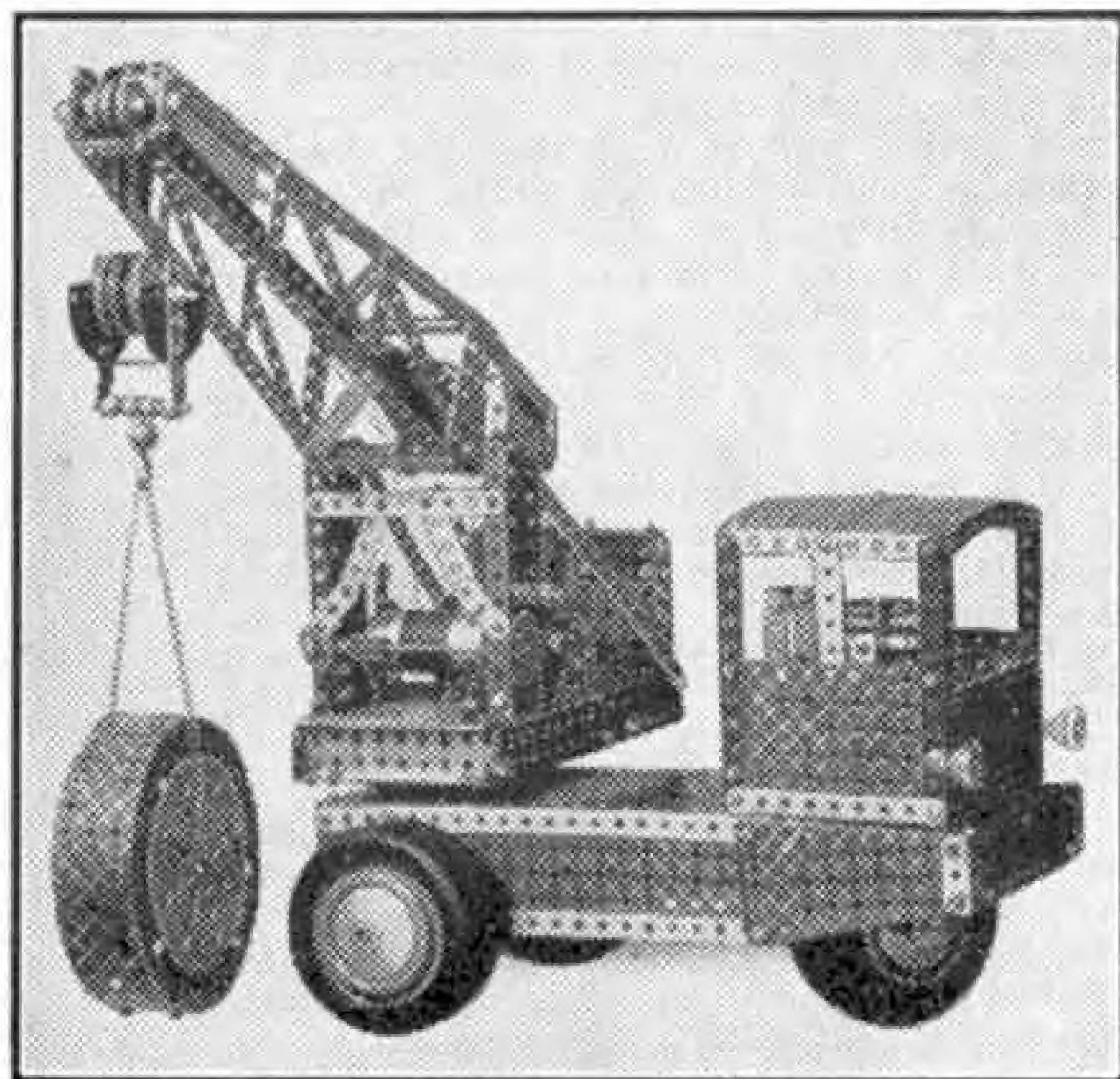


A novel machine for dealing playing cards, which won First Prize for H. H. Dowsett, London, in the "Autumn" Competition.

"New Year" Model-Building Contest

STILL TIME TO SEND IN ENTRIES

In last month's issue of the "M.M." we announced details of the great "New Year" Competition we have organised to provide model-builders with chances to win prizes for their efforts. This Contest will remain open until 31st March, so that there is still plenty of time to build models for entry in it and to submit details of them to us.



A fine model of a Morris mobile crane built by J. Matthews, Fillongley, Coventry.

For the benefit of readers who did not see the first announcement of the Contest the main details are repeated here. Models of any kind whatsoever may be submitted. All Meccano structures are eligible, whether they are simple model cranes built with small Outfits, or huge locomotives, machines or giant bridges built from the largest ones. Every competitor will have the same chance, whatever the size of his Outfit.

All that is required is a good drawing, or better still, a photograph. The competitor should write his age, name and address on the back of each photograph or drawing, and these should then be posted to "New Year General Model-building Competition," Meccano Ltd., Binns Road, Liverpool 13.

Entries will be divided into two sections according to the ages of competitors. Those from readers of 14 years of age or more will be placed in Section A, and those from competitors under 14 will be grouped together in Section B.

The following prizes will be awarded in each Section: First, Cheque for £2/2/-; Second, Cheque for £1/1/-; Third, Cheque for 10/6. There will also be Five Postal Orders for 5/-.



Club and Branch News



WITH THE SECRETARY

HELPING YOUNGER CLUB MEMBERS

One of the problems that is always in the minds of Leaders is that of bringing new life into their Clubs, and so of ensuring their continuance. This undoubtedly is best accomplished by the introduction of recruits, especially of younger boys who are given the chance to take part in Club proceedings and to acquire the real Guild spirit.

How best to interest recruits is another problem. In some Clubs it is solved by forming a separate section under the guidance of an assistant Leader or an older member. An even better way is suggested by the experience of the Hornsea Club, to which "Aspirants" are now admitted. These are mostly younger boys who assist the older ones in model-building. In practice this could be carried out in every Club by forming teams of two members each for model-building, especially in competitions. It will be found that the younger member of each pair takes pride in being associated with an experienced model-builder, while the senior is delighted with the opportunity of helping the younger one and introducing him to the best in Club life.

A SHADOW CLUB

A somewhat similar scheme is followed by the Maylands Club, the enterprising Australian organisation. The origin of this scheme was a flood of applications for admission to the Club following on a very successful exhibition. Accommodation for all of these could not be found in the Club room, and Mr. Malmgreen, the Leader of the Club, had the happy idea of forming a reserve. The members of this take part in games and all outdoor pursuits of the Club, and have acquired a full measure of the real Club spirit. Thus they are ready for incorporation in the Club itself whenever vacancies occur.

The fact that a successful exhibition led to the formation of the Maylands M.C. Reserve is an interesting point, for it proves once more the value of the publicity that follows on good displays open to the public. This point should be carefully kept in mind in planning exhibitions, open nights and similar proceedings. At these members should be specially appointed to supply interested visitors with information about the Club and Guild, so that possible recruits will be brought directly into touch with Club work while their enthusiasm is at its highest.

CONTINUITY IN MODEL-BUILDING

The middle of the second winter session is a very busy time in all Clubs, for model-building is at its height and preparations are being made for Easter Exhibitions and Open Nights. Where Club meetings are reduced in number owing to blackout and other difficulties, model-building can still be made the chief pursuit by arranging competitions for models of special kinds, members building their entries at home and bringing them to the Club room for judging. For one meeting members might be asked to construct models of warships or of army equipment, and cranes, motor cars and steam engines are other suitable subjects. It is a good plan to select the prize-winners by the votes of members themselves, but the judge may be the Leader or a friend with special knowledge.

MERIT MEDALLIONS IN 1941

Last year I expressed the hope that the determination of Club officials and members to hold their meetings in spite of the many difficulties confronting them would result in longer lists of Merit Medallion awards than in 1940. On this page is the list of those who have won the award, the highest that can be attained by Club members, during 1941, and it is slightly longer than that for 1940. I congratulate heartily all who have achieved the distinction in what in many respects has been the most difficult year in

MERIT MEDALLIONS AWARDED IN 1941

BANBURY (Twyford Grove)—J. W. Prescott, L. Hemming. EDINBURGH (The Schoolboy Model Club)—J. L. Samuel, T. Green, A. Craig, D. Fraser, J. Bulloch, T. Leggett, S. Renton, C. Clouston, G. Barron, D. Kelly. EXETER—D. Kennedy, L. Good, K. Addicott, F. Merrifield, D. Miller, J. Casley, G. Laskbrook. GLASGOW (Morison Memorial)—R. McDougal, W. Baxter. KETTERING (Blackfriars School)—W. Cleaver, D. Lindsay-Clark. LIVERPOOL (Blundellsands)—P. Haigh. LONDON (Acton)—H. B. Boreham, A. L. Leeder. (Clapham Common)—L. Mason, K. Maycock.

OVERSEAS CLUB MEMBERS

AUSTRALIA (Maylands)—A. Grant, J. Franklyn, P. Lindau, B. Whitney, E. Whitney. MALTA (Lasallian)—C. Zimmerman, J. Calleja, C. Farrugia. NEW ZEALAND (Ashburton)—C. Eden, C. Fitzgerald. (Christchurch)—R. Dixon, D. Pratt, V. Harrow, J. Moody. SOUTH AFRICA (Malvern)—C. Craill, B. Carson, H. Farrow.

the entire history of the Guild.

We must do even better in 1942. There are still many Clubs that have not been represented often enough in the lists of Merit Medallion winners, and I want the Leaders of these Clubs to make more use of the award. There is no restriction on the nature of the qualifying contribution to Club proceedings, so long as it redounds in some way to the credit of the organisation and of the movement. Good model-building, the introduction of new and attractive features in the programme, long and meritorious service and zeal in recruiting are typical examples of the good work for which the award has been made, and outstanding war work or instances of bravery and unselfishness also can be recognised. The Leader of a Club himself makes the nominations, two for each of the four sessions into which the Guild and Club year is divided.

Club Notes

PLYMOUTH M.C.—The Club is growing in strength very rapidly, 40 new members joining during November last alone. The first section of the new steel track layout is practically complete; the rails are in position and platforms and stations are now being finished. Excellent Meccano Model-building continues, and the Aeroplane Section also is making good progress. Club roll: 160. Secretary: M. Allen, 11, Rosedale Avenue, Peverell, Plymouth.

HILLSIDE (WHITEFIELD) M.C.—Model-building has

been the chief pursuit at recent meetings, models built and demonstrated including a miniature corvette and a realistic tank. One ingenious member built a farmcart that was hauled by his Cairn terrier, the performance arousing great interest and amusement. Short General Knowledge Contests have been held at each meeting. Club roll: 14. *Secretary*: D. I. Johnson, Burkewood, 27, Hillside Avenue, Whitefield, Nr. Manchester.

KING STREET LIBRARY (STRETTFORD) M.C.—Members who have recently joined the Guild proudly wear their badges at meetings. "Army Convoy" was

petitions for humorous, sporting and mechanised Army models have been held with success, and the annual sports meeting was held as usual, Rev. Father Manchi kindly presiding. An Exhibition of models also was held, with a prize for the best exhibit. Cricket was introduced as a Club recreation last summer. Club roll: 50. *Secretary*: A. Caruana, "Stadium View Flat I," St. George's Street, Gzira, Malta

Branch News

ACTON.—A Lecture on "Wagon Rebuilding" was illustrated by the renovation of a brake van that had seen good service on the Branch layout. Film Shows have been held, silent films accompanied by music being displayed. A fine programme has been arranged for 1942, and special attention is being paid to the new layout and the scheme for providing an Army hut for Headquarters that has recently been adopted. *Secretary*: S. W. Simmons, 37, Derwentwater Road, Acton, London W.3.

BEECH HALL (MACCLESFIELD).—Electric and clockwork layouts have been planned and constructed. The stations on the first of these are to be lighted electrically, and a marshalling yard is to be provided on the clockwork layout, which has a fine terminal station. Inner and outer tracks

are provided in order to give an intensive and interesting service. *Secretary*: I. Cheetham, Niarbyl, Barlow Road, Romiley, Cheshire.

WATERLOO (DUBLIN).—A new switchboard is to be installed at one of the stations on the Branch layout, which represents the Kent and East Sussex Railway. Traffic has been worked regularly over the line, mostly with the aid of the "Company's" own locomotives, but at times with representatives of S.R. locomotives on loan. *Secretary*: S. B. Carse, 38, Oakley Road, Ranelagh, Dublin.

ROCKPORT.—Very enjoyable meetings are being held and enthusiasm is great. There are indeed so many members in regular attendance that it is difficult to find posts for all of them on Track Nights. Adjustments are being made to the track in order to improve services. Scenery is being constructed, and it is hoped that a small repair shop can be installed when operations are again progressing smoothly. *Secretary*: D. Chamberlain, Rockport, Craigavad, Co. Down.

1ST ROUNDRAY (LEEDS).—Meetings continue to be successful. The layout has been altered and extended, and scenery is being provided. The hauling powers of Branch locomotives have been tested. A Visit has been paid to the station to see railway operations in progress there. Members are making small articles to be sold on behalf of the "M.M." Harmonica Fund. *Secretary*: F. G. Simons, 114, Talbot Road, Leeds 8.

ROCHDALE AND DISTRICT.—Electric lights have been fitted to the signals on the Branch layout, and stations and signals also are to be electrically lighted. The Library is growing satisfactorily. An outdoor railway was laid down at one meeting, the garden surroundings providing ideal scenery. Lantern Lectures have been given, and a Magazine is in preparation. *Secretary*: A. Morgan, 5, Ash Grove, Rochdale.



A group of members of the Martinwhite (Guildford) Branch No. 402, with Mr. P. Martin, Chairman. T. M. White, secretary, is on the Chairman's right. The Branch was incorporated in August 1940. A new Branch room with a separate workshop has been taken over recently, and a very fine non-continuous layout giving a long run for trains has been constructed.

the subject set for one Model-building meeting, and interesting models constructed represented British, Russian and German originals. In contests of this kind members themselves decide by vote which are the best entries. One member who is an engineer by profession makes a model for demonstration at each meeting. The first of these was a railway service crane, which was reproduced by other members at the following meeting, at which a splendid show resulted. Meetings for the construction of Navy and fairground models have been arranged. A Spelling Bee in which technical terms were introduced caused great amusement. Club roll: 15. *Leader*: Miss D. Carline, Public Library, King Street, Stretford, Manchester.

BARNARD CASTLE SCHOOL M.C.—The Club's Exhibition owed much of its success to the many fine models built by members. These included a workshop, a tipping steam lorry and an aerial railway. Many of the models were electrically lighted, and all showed praiseworthy ingenuity and perseverance on the part of their builders. Club roll: 17. *Secretary*: R. Churchill, The School, Barnard Castle.

HORNSEA M.C.—Good work continues in each section. In the Woodwork Section a lantern and switchboard are being constructed, while one member is making plans for his model railway. The usual Talks and Lectures have been given, and the training of Senior members as Assistant Leaders continues. Particularly attractive Lectures were given on "Submarines," "Norway" and "German Espionage." Club roll: 30. *Secretary*: C. Kemp, 5, Carlton Terrace, Cliff Road, Hornsea.

MALTA

LASALLIAN M.C.—The Club continues active in spite of constant alerts and other difficulties. Com-

Fun With Your Hornby-Dublo

General Hints on Trains and Stations

THIS article is intended to be of general interest to all Hornby-Dublo railway owners, whether they have only a moderate-sized outfit or whether they are fortunate enough to have a wide range of Dublo material.

We are all familiar with some local suburban station; probably in peace time we have spent a great many hours there watching the trains and operations generally. Probably our station consists of two platforms each served by a line of rails, one for "up" trains and one for "down." In miniature however it is not always possible to have a double-track system, although one can sometimes arrange for a length of double line to pass through a particular station. This enables us to separate the "up" from the "down" traffic at this point, and if the rest of the layout is single track the station concerned will form a suitable crossing point where trains in opposite directions can pass one another.

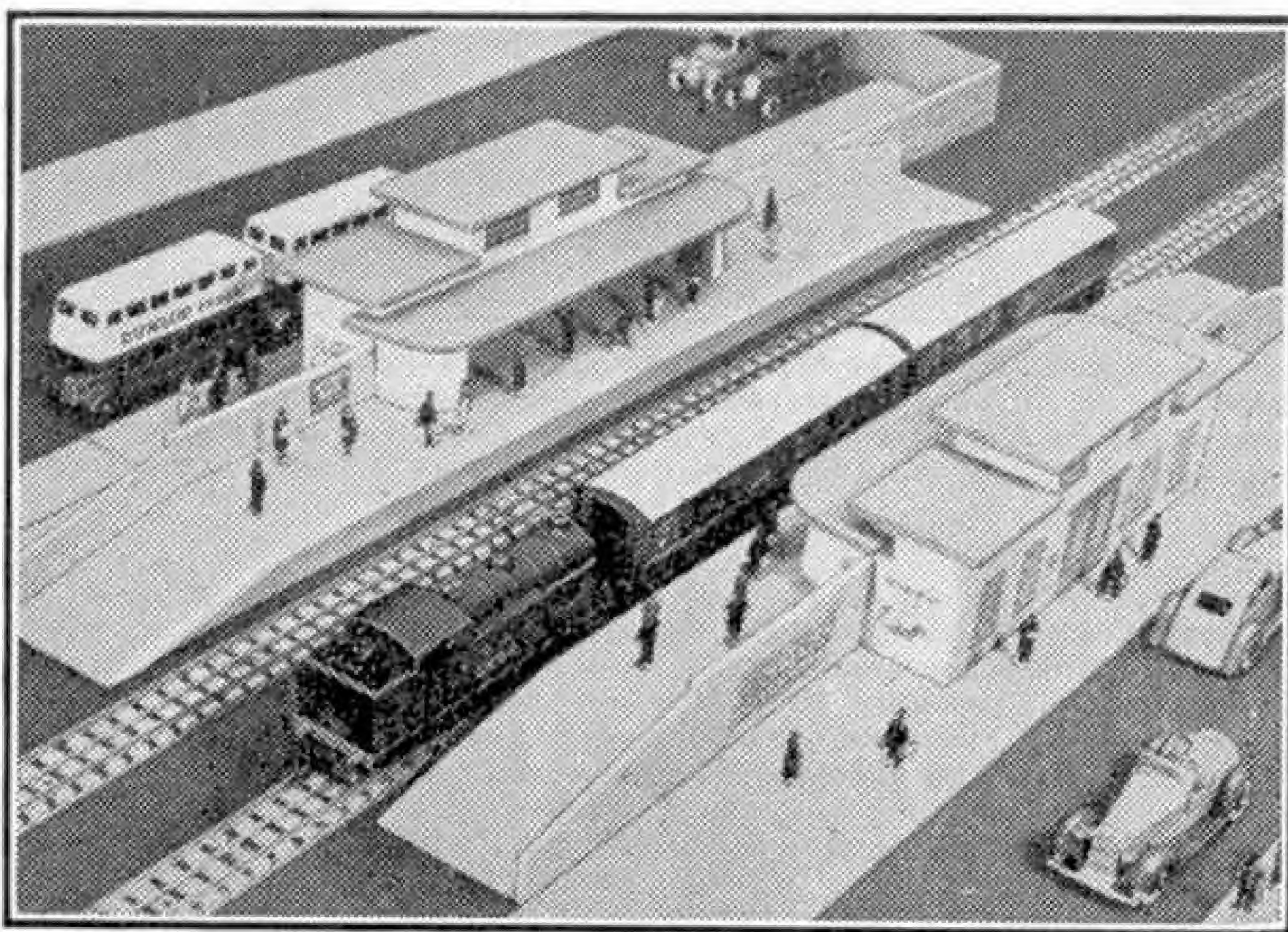
The Hornby-Dublo Main Line Station is ideal for operating the average main line passing or suburban type of station. It is a self-contained model, with a building representing the usual booking hall, rooms and offices, so that it can be used on its own on a single line layout quite well.

Two of these accessories will make up an excellent double-road station as shown in the illustration on this page. This represents the typical suburban station of real life, and also the type of train commonly using it. The "stopping passenger" consists of a Two-Coach Articulated Unit or "twin" hauled by one of the handy Dublo Standard Tanks. Readers who are familiar with L.N.E.R. practice in the London suburban area will no doubt immediately recognise it as an "up" train, for the engine is following the usual practice of "bunker first" working in the up direction. Tank engines on such duties are very rarely turned, so that the return or down

journey would naturally be made chimney first.

A realistic service could be worked with such a train even on the simplest layout. On arrival at the supposed journey's end, assuming that there was no running-round loop, the engine could be made to reach the other end of the train for the return journey simply by sending it round the layout.

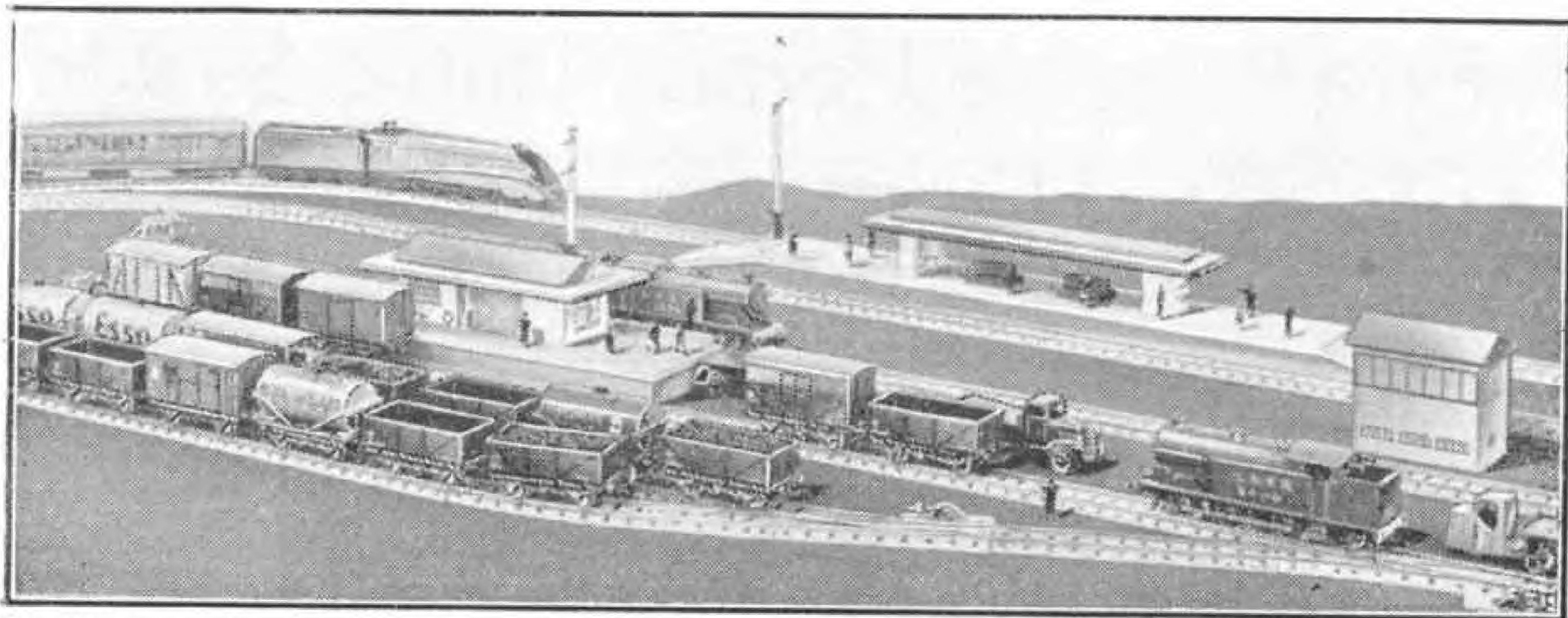
A simpler type of station is shown in the upper illustration on the next page. This is the Dublo Island Platform, which can be very effectively arranged between the up and down tracks. One of its special



Two Hornby-Dublo Main Line Stations form this typical suburban station in miniature. The train is hauled by one of the standard Dublo 0-6-2 Tanks.

advantages is that it saves space where the width available on the table or base-board is restricted. On big layouts it can be used in combination with one or more Main Line Stations to form a complete station with three or four tracks. It is specially useful for making up one side of a junction station where a branch line diverges from the main line. Branch line trains can be accommodated very nicely at the outside face of the Island Platform.

Branch line trains can be made up in the same manner as described for the suburban train referred to earlier in this article. They can also be operated on the "pull and push" principle as suggested



Shunting operations in progress in the goods yard on a Dublo layout. In the background is the Island Platform with a main line train approaching it.

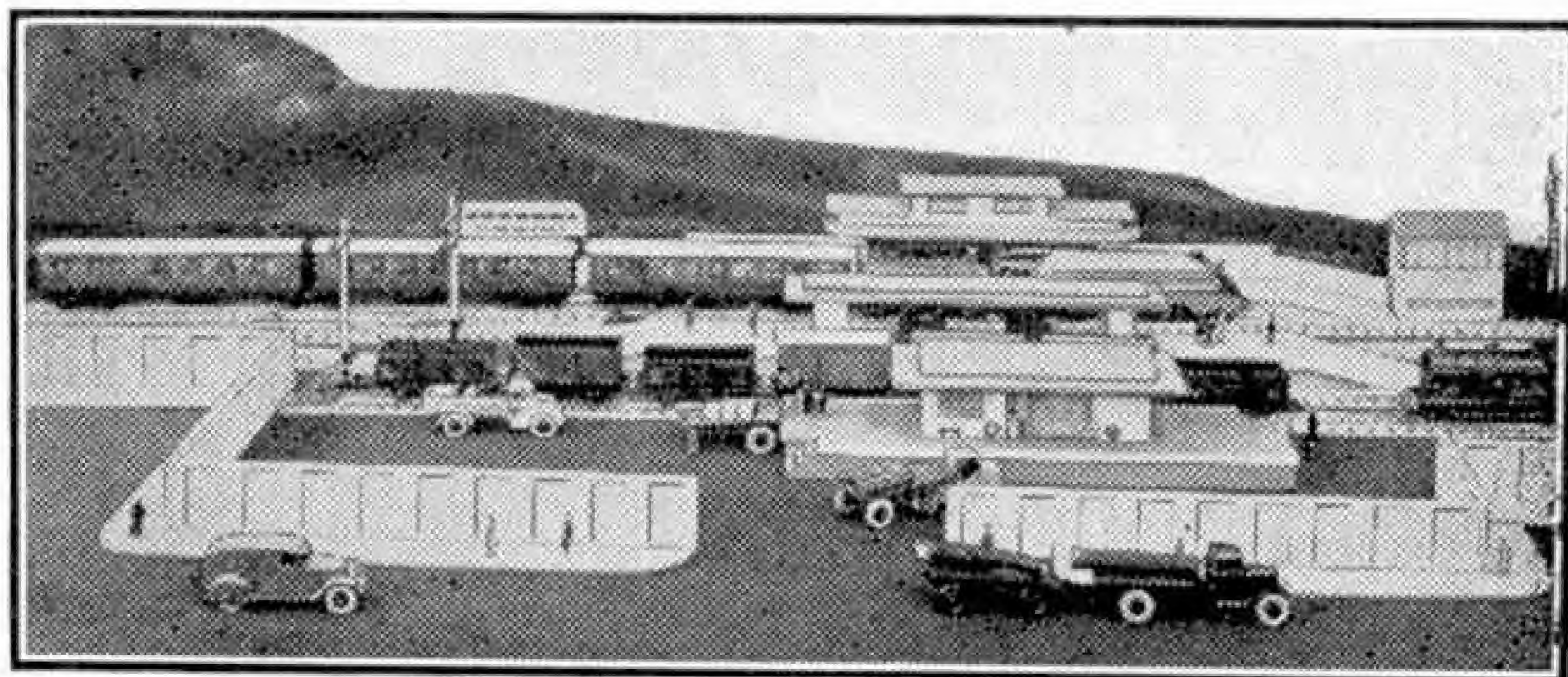
recently in these pages, the engine being always attached to the same end of the train. In one direction the engine travels chimney first and draws the train; for the return journey the coaches are pushed by the engine, the "driver" then being supposedly in the special driving compartment at what is now the leading end of the train.

Main line trains on Dublo railways to connect with the branch line train have a most imposing engine to haul them. This is the well-known model of L.N.E.R. No. 4498, "*Sir Nigel Gresley*," of the 4-6-2 "A4" class. One of these splendid engines is bringing its train into the station in the lower illustration on this page, this station actually being a combination of the Main Line Station and the Island Platform as described previously. One of the Two-Coach Articulated Units is incorporated in the train, and the other vehicle, next to the tender, is the standard Corridor Coach. This makes up a splendid express train very representative of "East Coast" main line practice.

As a variation from running the separate Corridor Coach over the whole of the journey made by the main line train, some readers may prefer to regard it as providing a through service to a branch destination. The Coach is detached during a stop at a junction station, is transferred to a branch line train, and so completes its journey.

Some station layouts may include sidings and accommodation for goods traffic, and a very pleasing arrangement is shown in the lower illustration on this page. Here there is a Goods Depot situated in a miniature yard, and the whole of the railway premises here are enclosed in a business-like way. Yards where more shunting and marshalling are carried on are usually farther away from passenger stations, but they may also include a Goods Depot.

In either case road motor transport is necessary in order to connect the Goods Depot with the neighbourhood, and in addition to the railway Wagons invariably to be seen in the yard several Dinky Toys Motor Vehicles can be used. The railway



A neatly arranged station layout including both passenger and goods traffic accommodation. The enclosed goods yard premises have a particularly pleasing and tidy appearance.

stock can be of several kinds, and some realistic effects are obtainable when the different Wagons are being shunted and generally dealt with in the yard. Coal and other open Wagons can be used effectively in arranging unloading scenes as they can be provided with miniature loads of various kinds.

A Fine Portable Hornby-Dublo System

IN the Hornby-Dublo article in last month's "M.M." we referred very briefly to a portable Dublo layout with scenic and lineside arrangements of special interest. This month we describe and illustrate the layout in question, which has been built up by Mr. C. P. Pluthero, of Teddington, from whom the photographs and the following details have been received.

The arrangement of the layout, which folds up and then resembles a portmanteau, as shown in the lower illustration on this page, has been due to the usual problem that besets the miniature railway owner, that of space. With no separate room for a railway available the system must be a portable one, and then there crops up the question of the storage of the various components. The arrival of a Hornby-Dublo Goods Train Set in circumstances of this kind caused Mr. Pluthero to set to work to make the layout so that it was complete in itself, yet instantly ready to be taken up and put away. This end was attained by fitting up two baseboards hinged in such a manner that they open out readily and yet equally easily fold up.

The method devised was to use two pieces of plywood stiffened by battens round the edges, and to hinge each of these to a "spacer" board. A closing or backboard of equal width to the spacer board was then attached to the outer end of one of the main pieces, so that when laid out the backboard stands vertically. When folded up the outfit becomes like the outer case of a match box; when laid out flat the base measures 5 ft. by 3 ft. 6 in. The backboard, besides forming the top cover of the "case" when folded, makes an effective background for the mountain and tunnel formed on the base of the layout. The appearance of distance is given by the painting on the backboard of a panorama of sky, hills and sea. The mountain through which a tunnel is bored was formed by screwing a piece of wire cloth or gauze to the baseboard and bending it into the shape of crags and gullies. When finally shaped it was thickly daubed with plastic wood and then painted to represent rocks.

The spacer board is at a lower level than the two main boards when the layout is opened out, so two bridges were made to span the gap and so allow the track to be maintained at a constant level. The bridges were made removable of course, and while

this was easy enough to arrange, a real difficulty was to ensure that at the same time the bridge rails would line up with the other rails in both directions and make good electrical contact. The correct positioning of the bridges was attained by the use of special dowels, while to secure the bridges and to obtain

good contact small tabs of brass were screwed on the bridges and similar tabs on the main base pieces. The contact or connecting clips on the bridge rails were removed and short lengths of flex were soldered to the running rails and to the brass tabs on the bridges. Small screws and connecting pieces serve the double purpose of

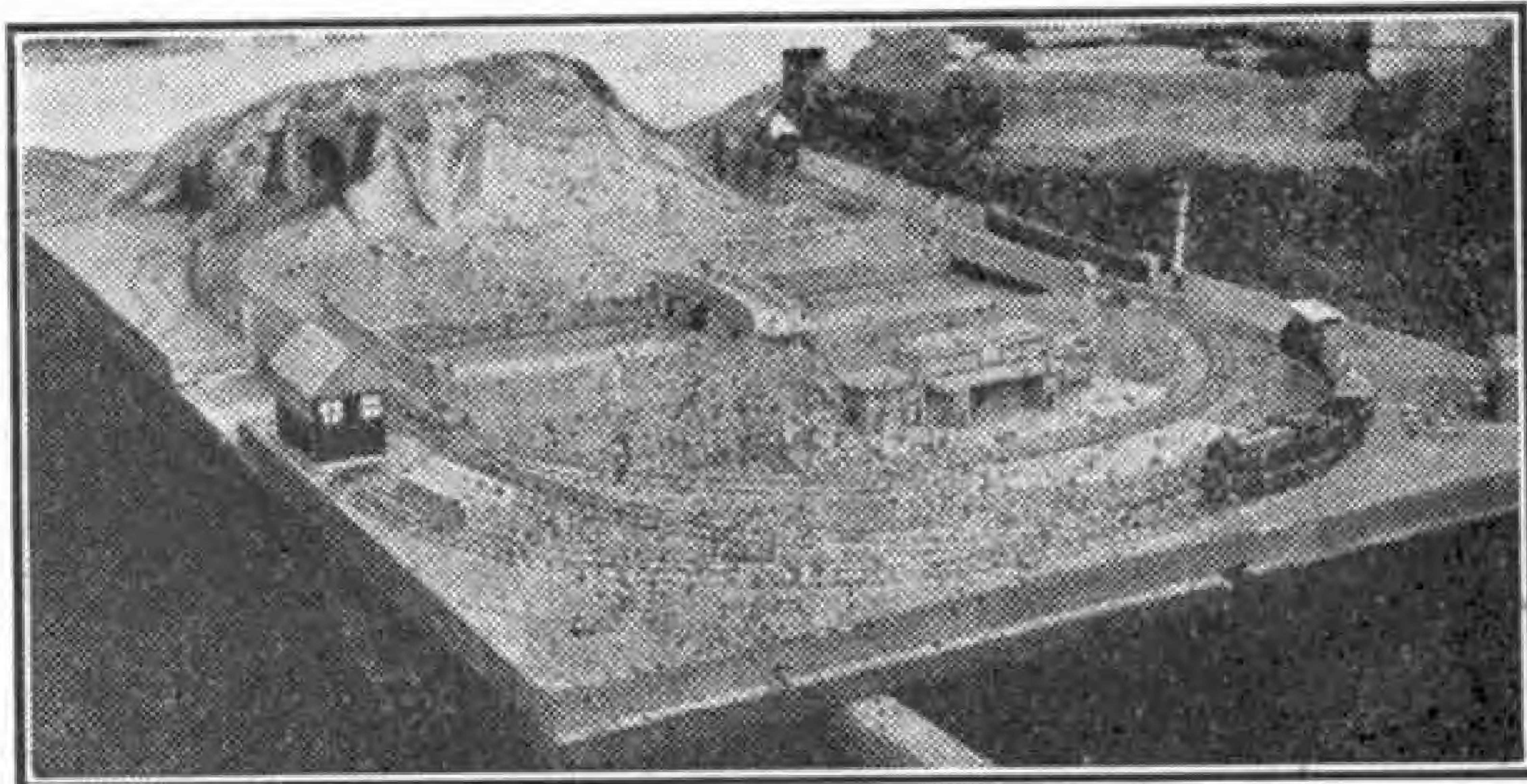
joining the tabs together electrically and holding the bridges down.

The channel across the centre of the layout due to the lower level of the spacer board has been taken advantage of to provide a miniature river. It is crossed by the two railway bridges just described, and midway along the "banks" there is a hump-backed road bridge. Roads, fields and general lineside features are painted on the baseboard, and fences, trees and animals help to complete the scene. The track itself includes several electrical sections that can be cut out when required. This division has been

planned because the owner of the line hopes to be able to have two locomotives at work running on the layout at the same time. A station, signal cabin and signals are among the railway items that are placed alongside the track, and these help to give the layout a busily realistic appearance.

Power is supplied from a motor-generator set made up from a 12-volt car dynamo and a suitable motor. In this case the "power house" is the garage, and leads are brought in from there to a plug fitted on the skirting board of a room in the house. When the railway is to be run the power plant is switched on, the "portmanteau" is opened out, bridges are fixed, and in a few minutes the railway is in operation.

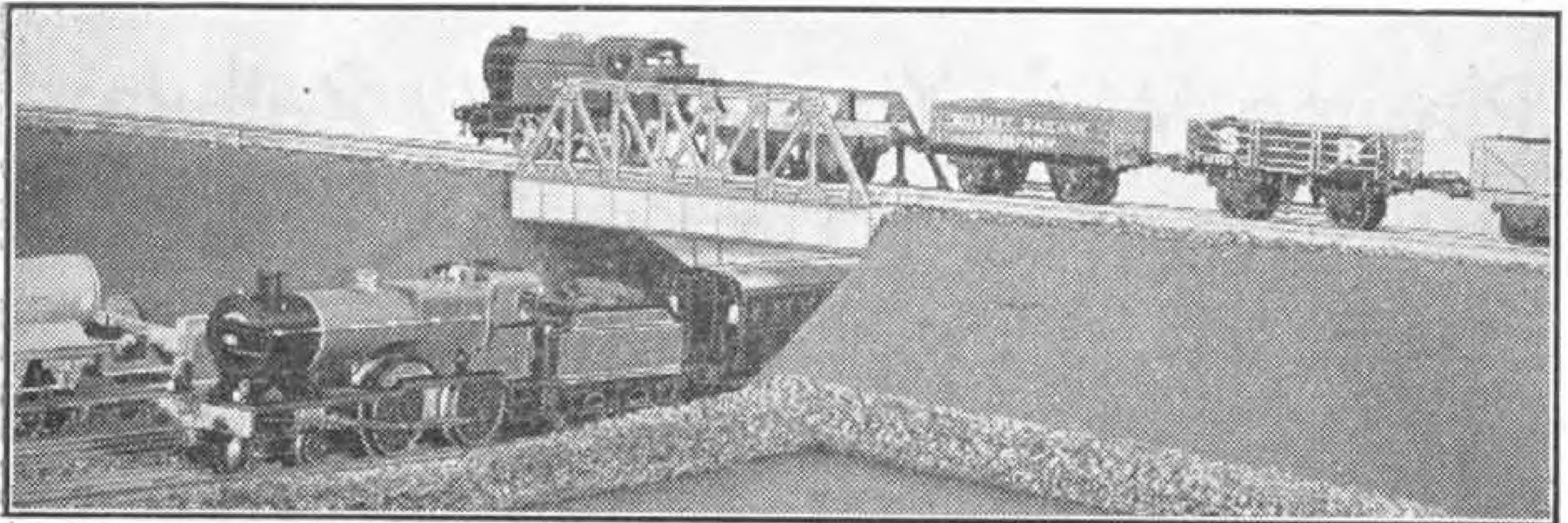
The outfit as it stands has been very successful and a great deal of enjoyment has been obtained from it without the bugbear of packing up every item. The complete case is more easily stowed away than a number of smaller packages. To perfect the whole scheme it is planned to arrange a series of "nests" for the rolling stock in between the plywood sides of the case and base pieces. Then the outfit will be entirely self-contained.



The folding or portable Hornby-Dublo layout of Mr. C. P. Pluthero, Teddington, that is described on this page.



The layout folded up like a case, ready for transport.



A freight train on a branch line crossing the main line on which a Hornby No. 2 Special L.M.S. Standard Compound is hauling a passenger train.

The Running of Hornby Locomotives

ON various occasions in these pages we have given hints on the running of Hornby Locomotives and the attention to be given to them periodically in order to maintain them in good condition. This month we return to the subject of running Hornby Clockwork Locomotives, but from a different point of view.

First, however, for the benefit of new readers, let us run over briefly one or two points to watch in connection with the running of clockwork locomotives. Regular lubrication of the working parts with a light oil, such as Meccano Lubricating Oil, is essential, but care should be taken not to use too much at once. Excess of oil attracts dust and dirt. Thick oil should never be used, as it tends to clog the mechanism. If the mechanism has become sluggish through the use of thick oil, or through dirt, it should be cleaned with a "mop" paint brush dipped in petrol. Do this well away from the fire. After cleaning allow the mechanism to dry and then give each bearing point a drop of oil. For the purpose of this article we will assume that these points have been dealt with.

The mistake is often made of assembling too heavy a train for the engine, particularly on a small layout where the length of straight track is short, so that a large proportion of the train is always on curves, thus adding to the drag on the locomotive. Since the power of the locomotive is limited, then

the plan we must follow is to limit the loads too, according to the type of engine and the type of train to be run. This will follow to a certain extent the classification for loads for the different types of engines that is observed in real railway practice. Naturally the scheme is more interesting on miniature railways where there are several engines of different types in use, but it can be applied where there is only one engine available.

A No. 2 Special Locomotive, for instance on the average layout will take three No. 2 Corridor Coaches

without difficulty over a reasonable length of run. Where there is a great deal of straight track the load may be increased to four Coaches, but for the present we will assume that three bogie vehicles is to be the limit for ordinary express trains. Therefore we make this the standard load.

If the working timetable arrangements should call for a specially fast run, then we may cut down the load for this particular train to two bogie vehicles. We may then follow L.M.S. practice, and call this in our working arrangements a "Special Limit" train. The train can in fact be made to assume something of the character of the special high-speed "Limited" trains that were popular on both L.M.S. and L.N.E.R. systems before this war.

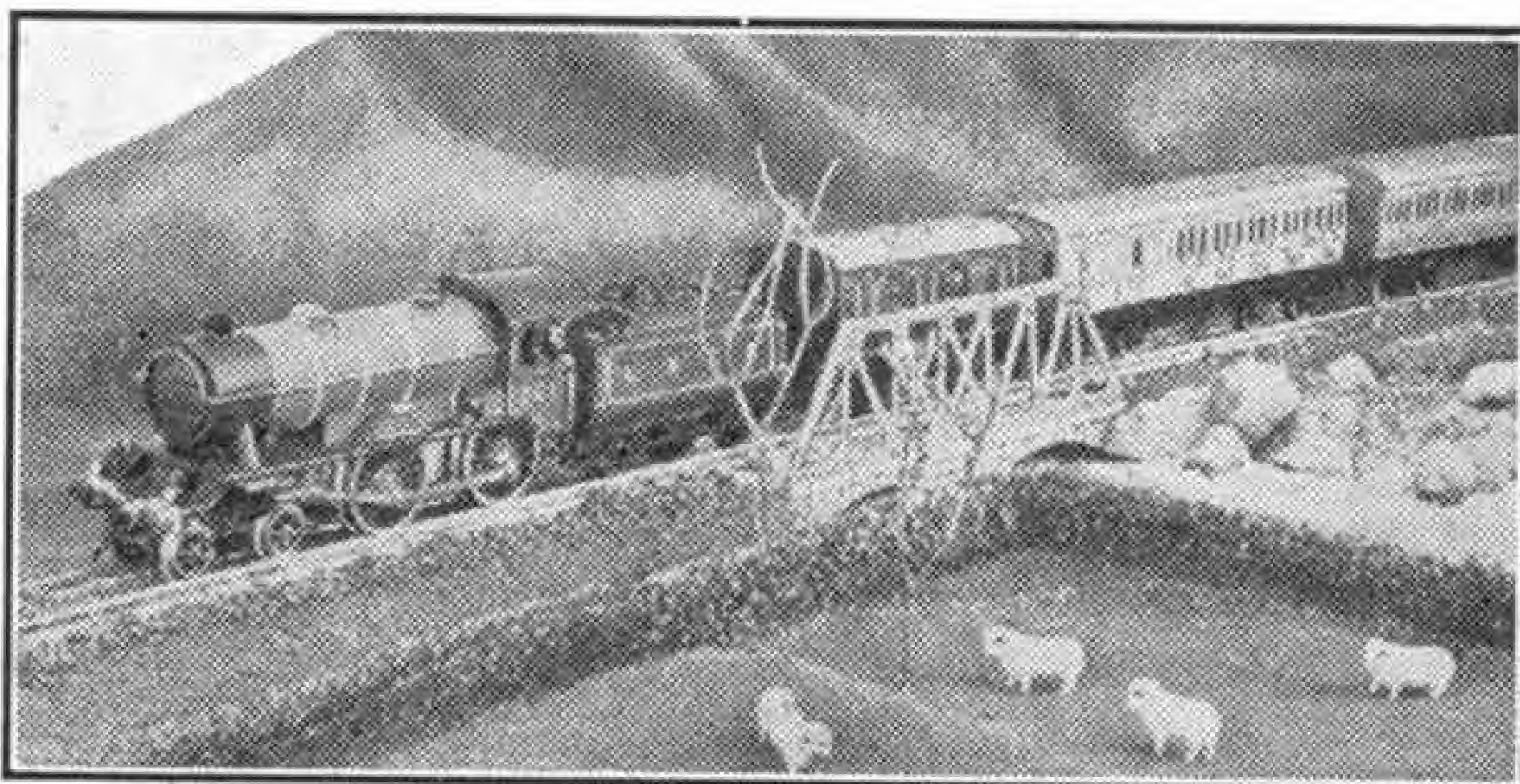
Similar arrangements can be made in connection with freight traffic. Model passenger engines usually perform a great deal of freight train haulage, as indeed do the "big sisters" in real practice nowadays. A fast goods or "fitted freight" train in miniature can be limited to say five or six Vans

and a Brake Van. Less important and therefore slower goods trains can be made up of a greater number of vehicles.

This method of limiting single-engine loads ensures that the engine will always be capable of dealing with the trains, and regularity of working will be ensured. Different load limits will have

to be arranged where there are several engines, and the testing of them in order to determine their most suitable loads will be found very interesting.

Remote sections of the line often have difficulties that do not cause much trouble to trains using them regularly, as loads are arranged accordingly. Limits will have to be fixed for any specials, such as excursions, that might be run over them, however, because the engines working them will invariably be of the normal main line type. This is the situation seen in the lower illustration on this page.



"The Bramham Moor" Hornby No. 2 Special L.N.E.R. working an excursion on a single line section. Note the realistic bridge and stream effect.

Playing With Your Hornby Railway

THE diagram on this page shows a layout that will provide a great deal of entertaining running with a single train. It is a layout that will appeal particularly to younger readers. It is a development of the favourite oval, and points are included to form part of a triangular junction joining together the two opposite straight sides of the oval. The number of rails required is the same whether the railway is clockwork or electric, and the manner of assembling them will be plain from the diagram. Working the railway will be found specially good fun if two or even three boys join together to run it. This will also have the advantage that if one of the boys cannot assemble the layout completely from the rails that he has, he may be able to make up what is required from the rails owned by one or other of his friends. Similarly different trains can be run at different times, and not only will the interest be varied by using each boy's train in turn, but the performances of the engines can be compared.

The simplest run that a train can make is a circuit of the main line, and this can be done as many times as required if the operators wish to test and compare the haulage power of the engines, and the length of run if the engines are clockwork.

The layout consists of a combination of the oval and the circle, with an additional diagonal track or "return loop" as we can call it. Whichever way the train happens to be running along the main track, the circular track at the right-hand end in the diagram offers an alternative route. Whenever this route is taken, however, the working of the points must be done smartly, and this is where the advantage of having several operators comes in. Two "pointsmen" could attend to the points, one on each side of the layout, with another boy acting as the train "crew." Duties could be changed in turn so that each operator could manage the train running for a spell. The circular track, or rather that part of it lying between the two points on the main line that lead to it, could also be used to hold the train in between trips. In fact before commencing operations the train could be assembled there, and then run out on to the main line when required for its first trip.

If the train is running along the lower main track in the diagram from left to right, a further variation in operation is possible. Having reached the left-hand points at the top of the diagram the train can be diverted as if about to make a run on the track.

Instead of doing so, however, it can be sent across the diagonal "return" track, by having the points in the centre of the layout set for the straight run. Actually these should be set before the main line points are worked: then if the "pointsmen" is not quick enough to operate the points at the top of the diagram, the trains can continue round the main line and be worked into the centre of the layout by means of the left-hand points on the lower main line. By the time this has occurred the upper main line points will have been operated, the left-hand points in the centre having already been set, as described previously.

Whichever points on the main line are used to send the train on to the diagonal or return track, the result is ultimately the same; when the train rejoins the main circuit it will be travelling in the opposite direction from what it was previously. As soon as the main line is regained both the points must be re-set for the straight run; otherwise

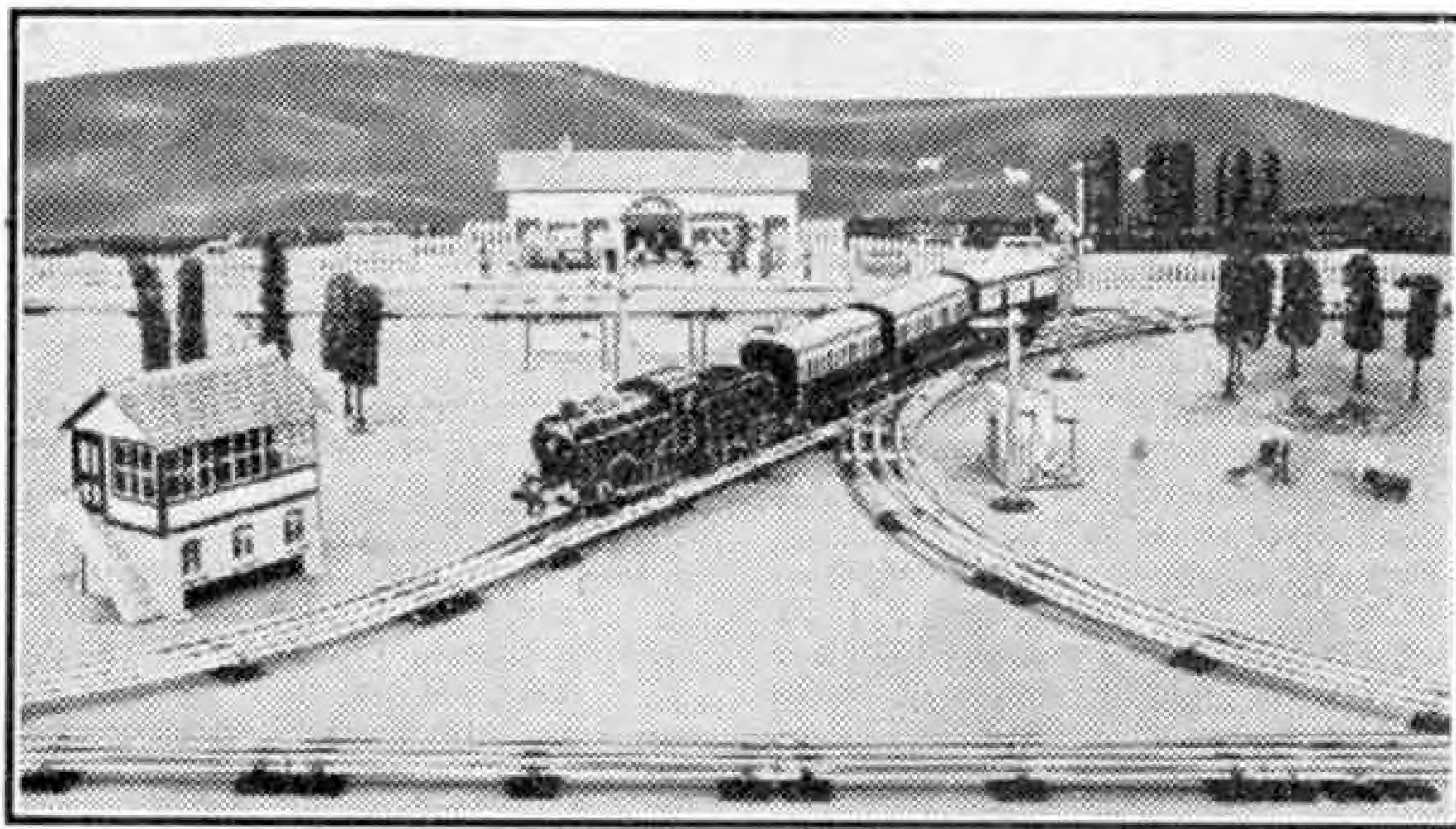
there will be trouble when the train next reaches either of them!

In the ordinary way it will be impossible for the train to use the diagonal track again. There is, however, a way by which the original direction of travel can be regained. The train is run just past the lower set of points leading to this track and then stopped. The points are then set for the diagonal track, and the train is backed down it until the

engine has cleared the points in the centre; these points are moved and the train runs forward over part of the circular track until the main line is regained. By this method of working the train is restored to its original direction of running. A simpler method still will be to halt the train just past the upper set of "diagonal" points; the backing movement is then carried out along the diagonal track alone until the opposite side of the main oval is reached. The first-mentioned scheme, however,

probably will be preferred because of the somewhat exciting sequence of movements and points operations. The "pointsmen" must be alert in order to carry out the movements properly.

Similar movements of various kinds can be devised almost without end, and of course many variations of a similar kind of layout are possible. Readers who try the scheme described here and then go on to further developments on their own account will, we are sure, have a great deal of fun. We shall be glad to receive details of any interesting ideas that readers may work out in this way.



A train running across the diagonal track that joins the opposite sides of the main oval.

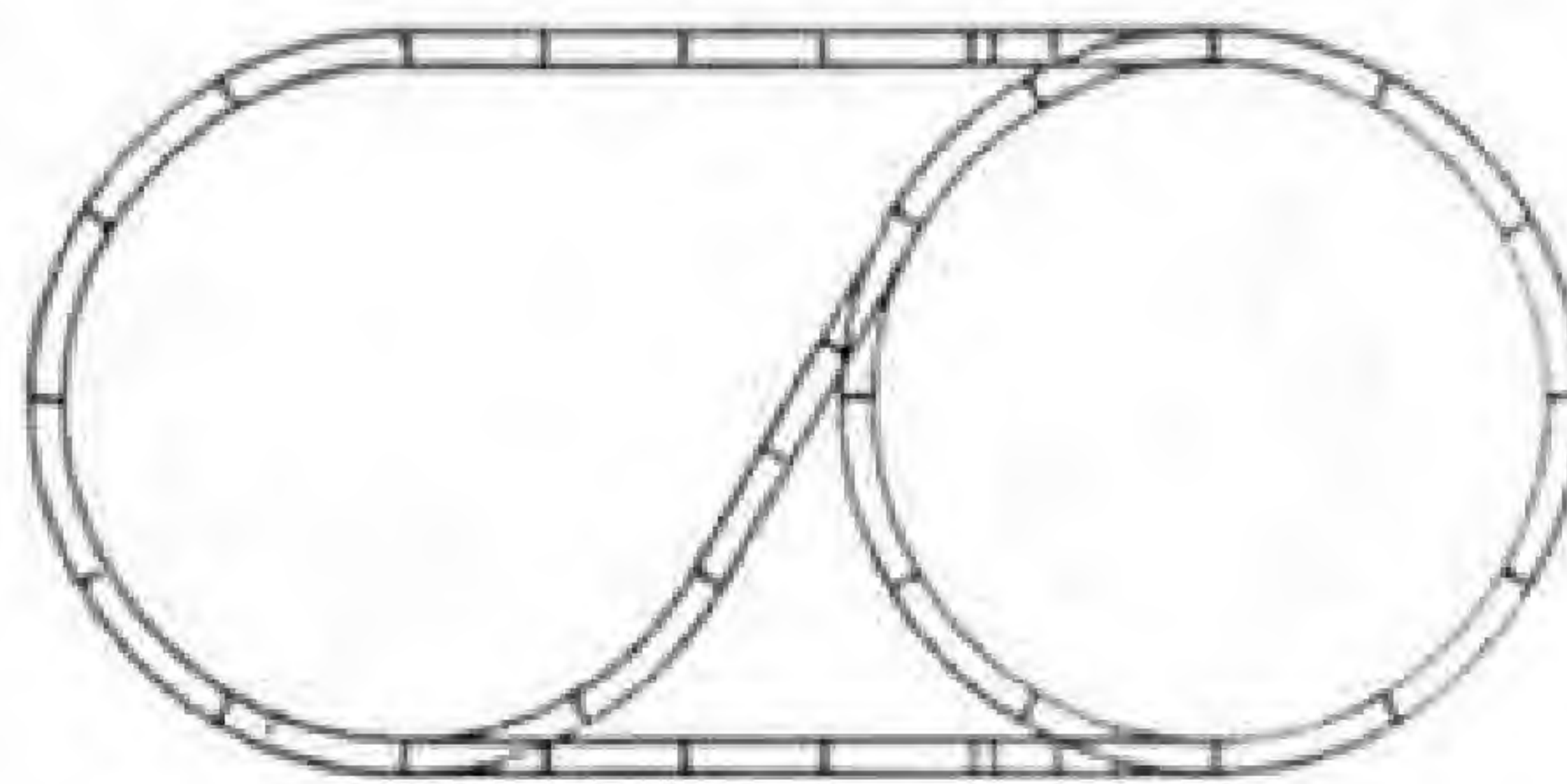


Diagram of the layout referred to on this page. Rails required (2 ft. radius, Electric) 16 EA2, 9 EB1, 2 EB $\frac{1}{2}$, 2 EB $\frac{1}{4}$, EPR2, 3 EPL2.

A Workmanlike Hornby Layout

A MINIATURE railway owned by one who has had actual operating experience on a real system is bound to incorporate a number of interesting features, and this is certainly so with the layout that forms the subject of this article. It belongs to Mr. R. A. Jeans, of Street, Somerset, who has sent us the material from which our description has been written.

The track is arranged on a raised base-board and is happily sited in a large attic so that a fair amount of space is available. The layout is of the continuous type. In the space available in a single room this is the only method that allows a satisfactory impression of distance being covered by the trains. They necessarily pass over the same track many times in making a journey, but imagination allows us to suppose that each stop is made at a different station until the journey is completed.

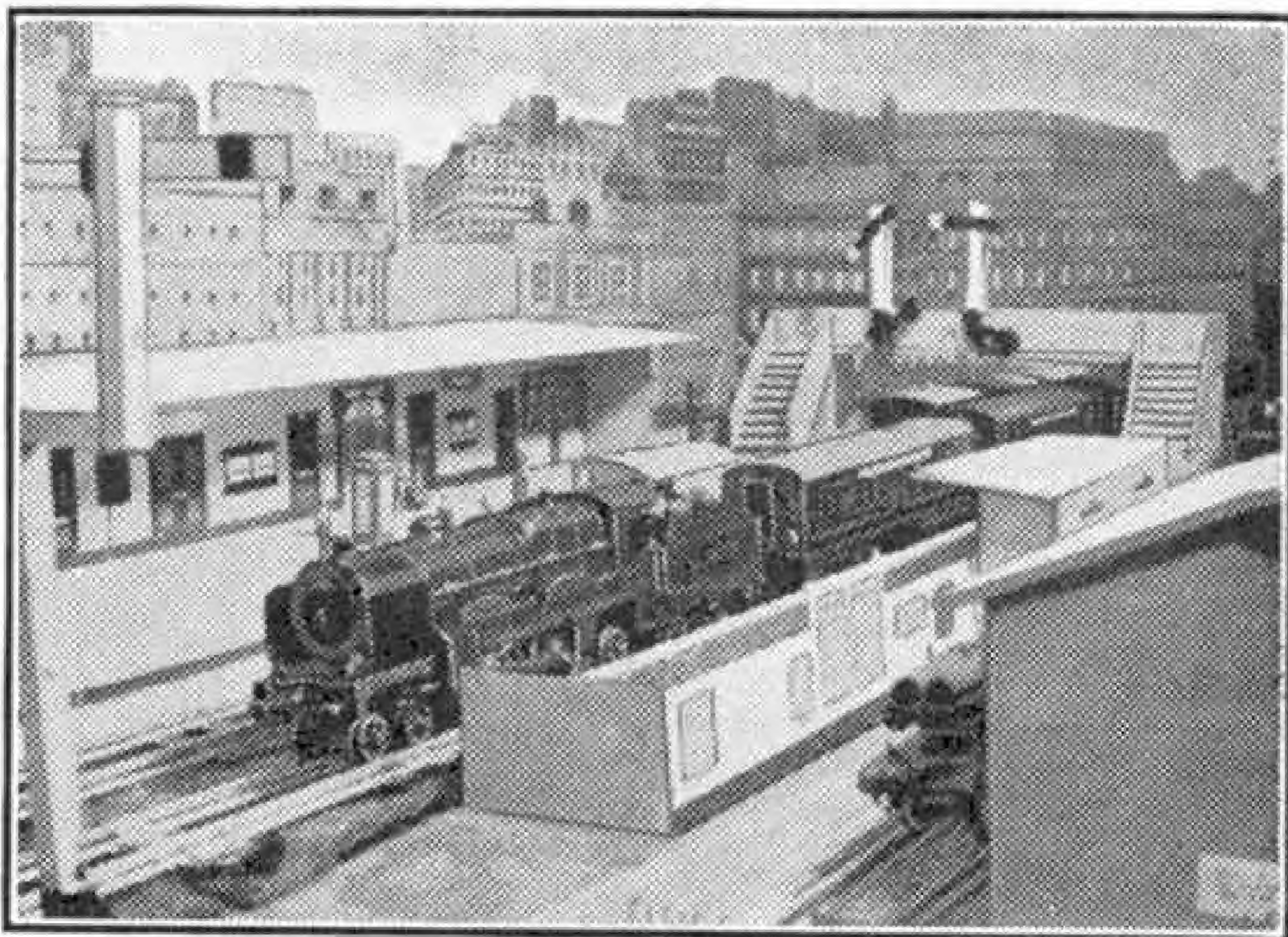
The main line is laid in Hornby Tinplate Double Track and the rails generally are screwed down with a layer of thick felt between the sleepers and the base-board. This deadens the noise of the trains and makes a fair imitation of a ballasted road-bed. The actual base-board is painted in flat colours to represent either grass or asphalt. Sidings and a marshalling yard are provided of sufficient extent to deal with the rolling stock in use on the line. Behind the station the long road will hold up to 20 four-wheeled vehicles; the shorter road serves the goods shed, which is entered by the wagons from one end only.

The capacity of the marshalling yard is over 50 four-wheelers; this yard has four roads and is reached from the outer main or up line by means of facing crossover points joining the up and down tracks.

Operations on the railway are based on the L.M.S. Midland Division main line between Derby and Bristol, of which the owner has had working experience. Actual schedules are drawn up and worked

passenger type Guard's Vans in L.M.S. colours.

There are some 30 Vans of the Meat, Fish, Refrigerator and Banana types, such as are commonly found running in real "fitted freight" services. The term "fitted," by the way, implies that the vehicles are provided with automatic continuous brakes and



A striking scene on the layout of R. A. Jeans, Street, Somerset.
Photograph by E. J. Hoare, Street.

can run in passenger train formations or in express goods services where the use of brake-fitted vehicles is required by regulations. There are also ordinary goods or No. 1 Luggage Vans, Flat Trucks and Containers for loading on them, Open Wagons, No. 2 High Capacity Wagons in L.M.S. colours, and No. 2 Lumber Wagons.

Most of the passenger trains are hauled by one of the Hornby No. 3c "Royal Scot" engines. Another

No. 3c Locomotive is No. 5710, an ex-Riviera "Blue" model repainted black and lined in red, and so appropriate for freight and mixed traffic work generally. The only other engine is No. 70, a Hornby No. 1 Special Tank, which has a busy time with local passenger, shunting and pick-up goods work.

The various buildings on this line, such as the station, signal box, goods depot and engine shed, have all been made at home from plywood and painted in flat "poster" colours. The scenic effects include countryside features, and in addition there are splendid representations of houses, shops and manufacturing establishments. All these are laid out and painted on sheets of cartridge paper which are pinned to the walls of the room. One or two buildings have been drawn and painted on cardboard sheets cut out to the outline of the particular building. They

are pinned up on the background scenery and stand out very well.

The railway is correctly signalled. All the signals are of home construction, and are worked from the signal cabin by means of fine cord led through screw eyes attached to the baseboard.

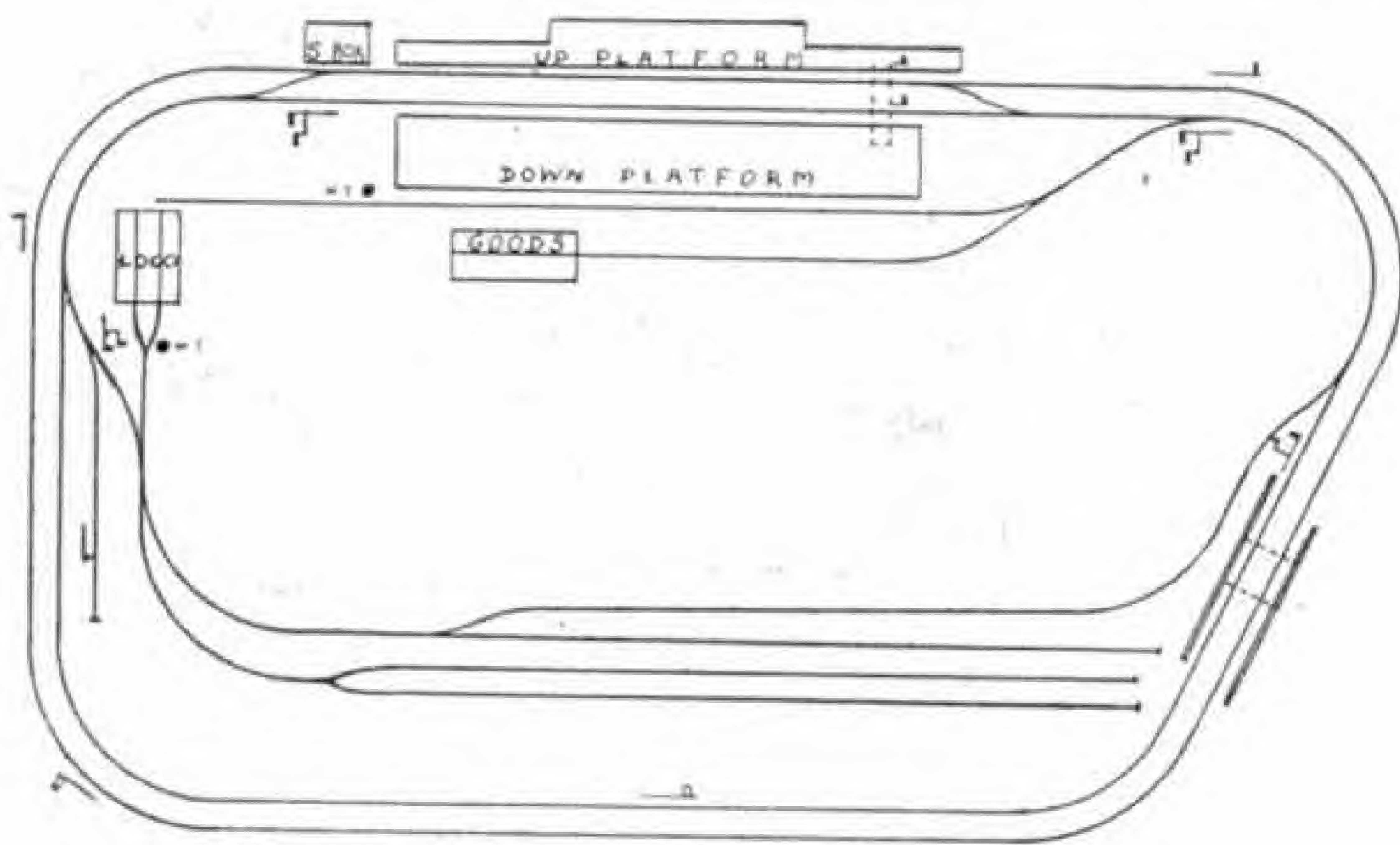


Diagram of the layout described in this article.

to, different periods or "episodes" representing night, day, or afternoon services.

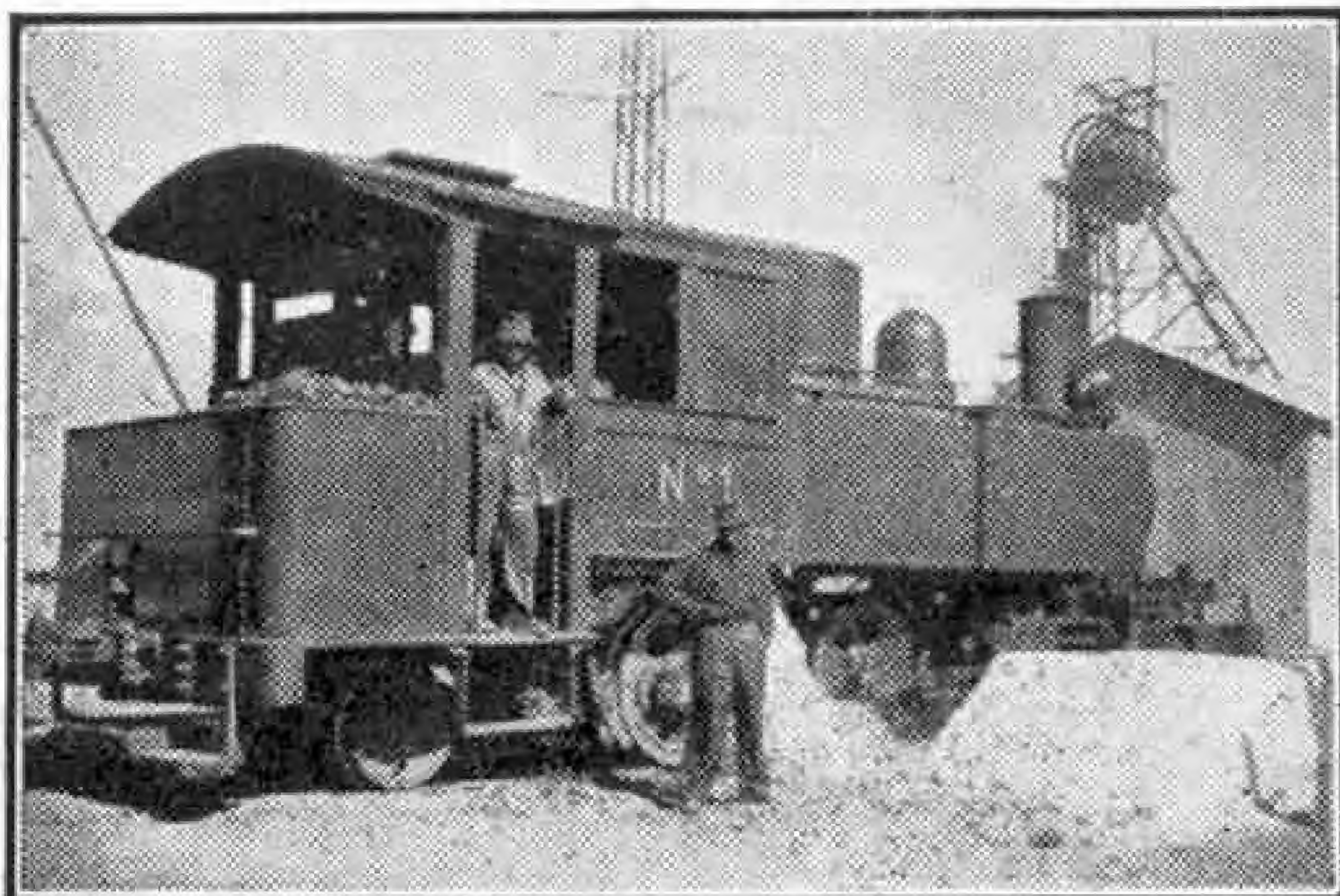
Passenger trains are made up as a rule of Hornby No. 2 Corridor stock; there are also two Hornby Riviera "Blue" Coaches that have been repainted in L.M.S. colours. Other coaching vehicles include two

From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

RAILWAY SYSTEMS OF THE RAND GOLD MINES

Most of the Witwatersrand gold mines have their own railway systems, complete with water tanks, engine sheds, and other necessities. The 2-6-2T locomotive in the photograph is one of several tankers



A 2-6-2T locomotive at work at the Simmer and Jack mine on the Rand. It is used for hauling gold-bearing rock to the stampers. Photograph by I. Benjamin, Germiston, Transvaal.

owned by the Simmer and Jack mine. It is of English manufacture, and has two external cylinders. The diameter of the driving wheel is 3 ft. 3 in., while that of the leading and trailing wheels is about 2 ft.

This locomotive runs on the standard South African gauge track of 3 ft. 6 in. and is manned by a white engine-driver with two native stokers. The locomotives at some mines carry no sand pipes, and there on rainy days two natives sit on the platform in front of the engine scattering handfuls of sand on to the rails. A third native is usually employed to run on ahead to throw over the point-switches.

The chief duty of these engines is to haul long lines of hoppers carrying gold-bearing rock from the mine headgear to the stamper, where the rock is crushed and the gold ore extracted. The gold ore is then loaded on to trucks belonging to the South African Railways. These trucks are taken to a depot near by where they are picked up by passing goods trains and hauled to the refinery, to have the precious yellow metal finally extracted.

The use of these mine locomotives has greatly speeded up the despatch of gold ore to the refinery. They are extremely interesting, as they are among the last of the South African tank engines, or "coffee pots" as they are humorously called.

I. BENJAMIN (Germiston, Transvaal).

CHURCH BELLS HUNG ON GROUND LEVEL

The Church of St. Mary in the little village of East Bergholt is unique in that the bells are hung in a wooden cage in the churchyard, where they have been used for the past 400 years. This belfry is claimed to be the only one in existence where the bells are hung on ground level, and where each is swung by handling the stock of the bell itself. The ropes are used for chiming only.

The treble bell, weighing 12½ cwt., is modern, for

it was cast in 1887 and has on it the impressions of eight coins of that time. The second bell, known as "Gabriel," was founded in 1450 and is still going strong. It also weighs 12½ cwt. The third bell, founded in 1601, weighs 14½ cwt. and bears the inscription "Sum Rosa Pulsata Mondi Maria Vocata," which means, "My name is Mary; for my tone I am known as the Rose of the World." The fourth bell, cast in 1688, shows coins of Charles II and weighs 18½ cwt., and the tenor bell, weighing 25 cwt., simply bears the date 1727.

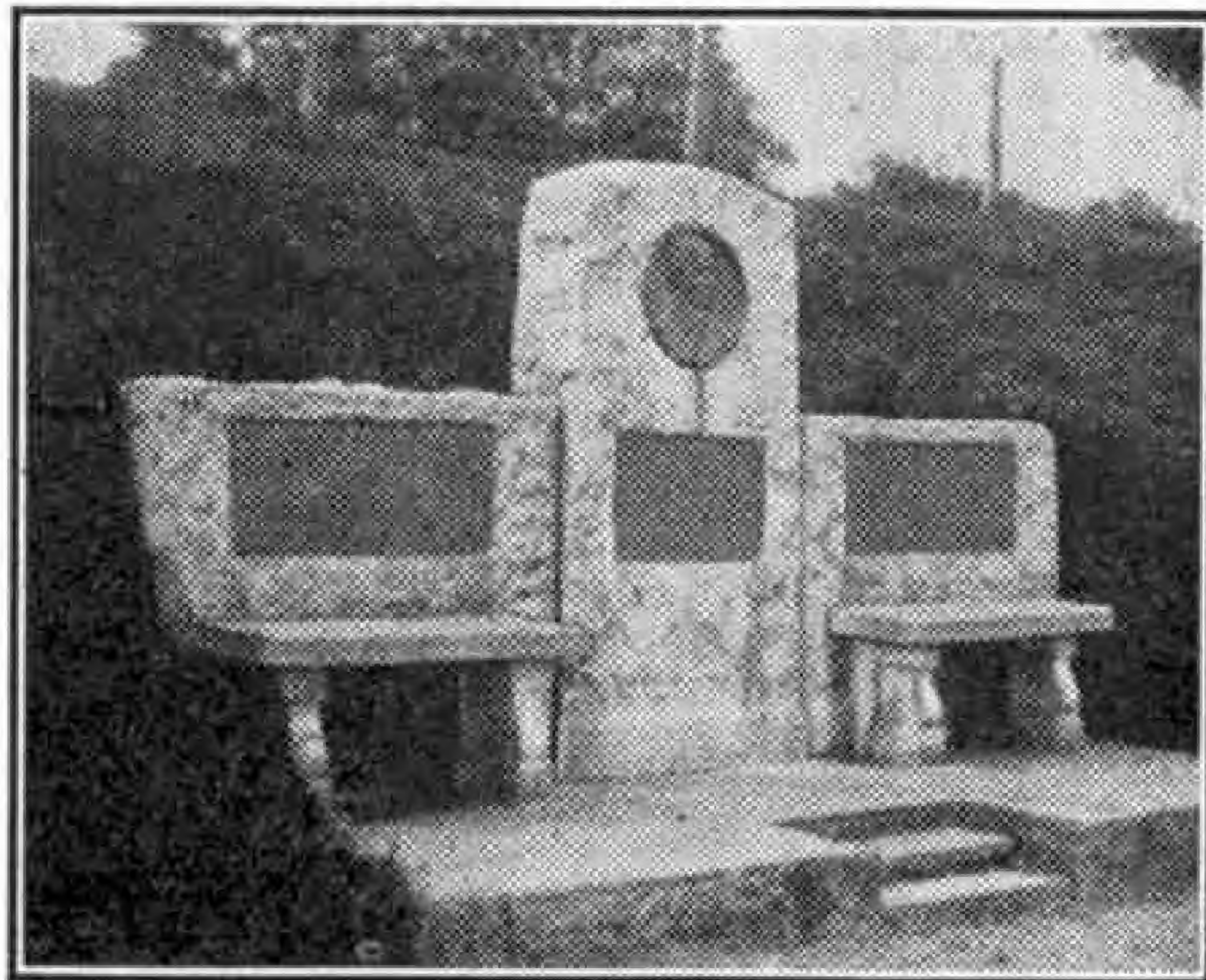
Parts of the church date from the 14th century, but the tower, where the bells would normally have been, was commenced by Cardinal Wolsey about 1520, and was left unfinished on his subsequent disgrace. Local legend however maintains that when nearing completion it became possessed by the devil, who immediately demolished it. The builders, fearing a recurrence of this sort, refused to rebuild the tower, whereupon the present-day bell case was erected.

G. CASELEY (Ipswich).

FROM STONEMASON TO FAMOUS ENGINEER

A few miles from Langholm in the Scottish border country stands a granite roadside monument to Thomas Telford, the stonemason's apprentice who became a famous engineer. It faces up the large beautiful valley where he was born in 1757.

After working in London and at Portsmouth Dockyard, Telford was appointed County Surveyor for



The Telford monument, Westerkirk, near Langholm. This faces across the Esk to the valley in which the great engineer was born. Photograph by J. King, Glenalmond.

Shropshire, in which capacity he built a stone bridge across the Severn and the iron bridge at Buildwas, the second iron bridge built in Great Britain. Subsequently he carried out Highland surveys and constructed the Caledonian Canal. The work by which he is best known is the Menai Suspension Bridge, completed in 1825.

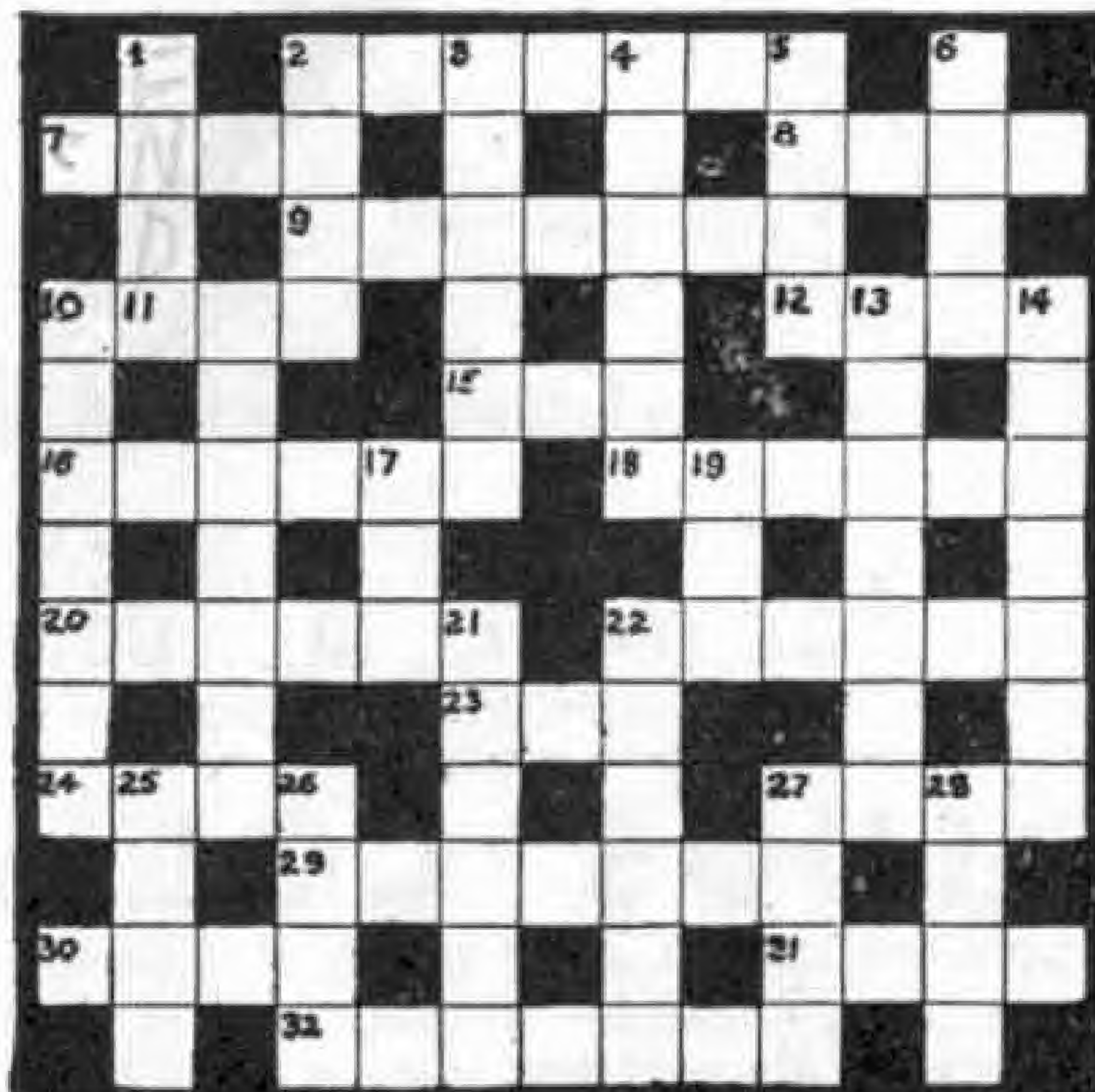
J. KING (Glenalmond).

Competitions! Open To All Readers

February Crossword Puzzle

CLUES ACROSS

2. White Wine.
7. Receive.
8. Mountains.
9. Vaulter.
10. Stupefy.
12. Carol.
15. Fish.
16. Cilician town.
18. Arranger.
20. Call for.
23. Conjunction.
24. Storm.
26. For fear that.
28. Sugar.
29. Sudden pain.
30. Not one.
31. Relations.



CLUES DOWN

1. Final.
2. Ignoble.
3. Sequence.
4. Denote contents.
5. Consumes.
6. On.
10. Session.
11. Disentangle.
13. Severe.
14. Article of clothing.
17. Welsh river.
19. Used for rowing.
21. Invests.
22. Furrow.
25. Expression of grief.
26. Urges on.
27. French town.
28. On seashore.

It is some time since we had one of the crossword puzzles that readers of the Magazine enjoy so much, so here is a specially interesting one that has been contributed by a reader, T. K. Chaplin. There are no difficult or unduly puzzling clues in it, and every word can be found in standard dictionaries.

As usual, there are two sections in the competition, for Home and Overseas readers respectively, and in each prizes of 21/-, 10/6 and 5/- will be awarded for the best solutions. If necessary the judges will

take neatness and novelty into consideration in making their decisions. Consolation prizes also will be awarded, so that every reader will have a good chance of winning a prize.

Entries should be addressed "*February Crossword Puzzle, Meccano Magazine, Binns Road, Liverpool 13.*" Competitors must remember to put their names and addresses on their entries. The closing date in the Home Section is 28th February; that in the Overseas Section is 30th June.

A Railway "Quiz"

Members of the Hornby Railway Company, and indeed every reader of the Magazine who is interested in any way in railways, will find this month's competition attractive and easy. It takes the form of a "Quiz" contest. What is required of the entrant is to name the railway features—which may concern locomotives, track, or any other part of a railway system—that answer to the conditions of the questions. To help readers we indicate the number of letters in each answer, using dashes to represent consonants and crosses to represent vowels.

Here are the clues:

1. Part of permanent way; - - x x - -.
2. At the end of a train; - x x - - x - -.
3. Famous streamlined locomotive;
- x - x - x - x x -.
4. Seen between wagons; - x x - - x - - -.
5. Built near every locomotive depot;
- x x - x - - - - x - -.
6. Found in a signal cabin; - x - x - - - x - x.
7. Some coaches have these; - x - - x - x - -.
8. One of the duties of a tank locomotive;
- - x - - x - -.
9. Off the main line; - x - x - - -.
10. Driven by a turbine engine;
- x - - x - x - x - x.
11. Famous for his "Pacifics"; - - x - - x -.
12. Connected to the piston; - x - - x - - x -.
13. A meeting of tracks; - x - - - x x -.
14. Part of an engine; - - x - x - x - - x x -.
15. There are many of these in the cab; - x x - x -.
16. Part of a tank locomotive; - x - - x -.

17. An early locomotive; - x - - - - - x -.
18. Home for engines; - x x - - - x x - x.
19. No steam locomotive could run without it;
- x x - x -.

20. A G.W.R. Van; - x - x.

In both Home and Overseas sections of this contest prizes of 21/-, 10/6 and 5/- will be awarded for the best solutions in order of merit, and novelty and neatness will be taken into consideration if there is a tie for any prize.

Entries should be addressed "*February Hidden Word Contest, Meccano Magazine, Binns Road, Liverpool 13.*" and the closing dates are; Home Section, 28th February; Overseas Section, 30th June.

February Photographic Contest

This month's photographic contest is the second of our 1942 series, and in it, as usual, prizes are offered for the best photographs of any kind submitted. There are two conditions—1, that the photograph must have been taken by the competitor; and 2, that on the back of each print must be stated exactly what the photograph represents. A fancy title may be added if desired.

Entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. They should be addressed "*February Photo Contest, Meccano Magazine, Binns Road, Liverpool 13.*" There will be separate sections for Overseas readers.

In each section prizes of 15/- and 7/6 will be awarded, together with consolation prizes for good efforts. Closing dates: Home Section, 28th February; Overseas Section 30th June.

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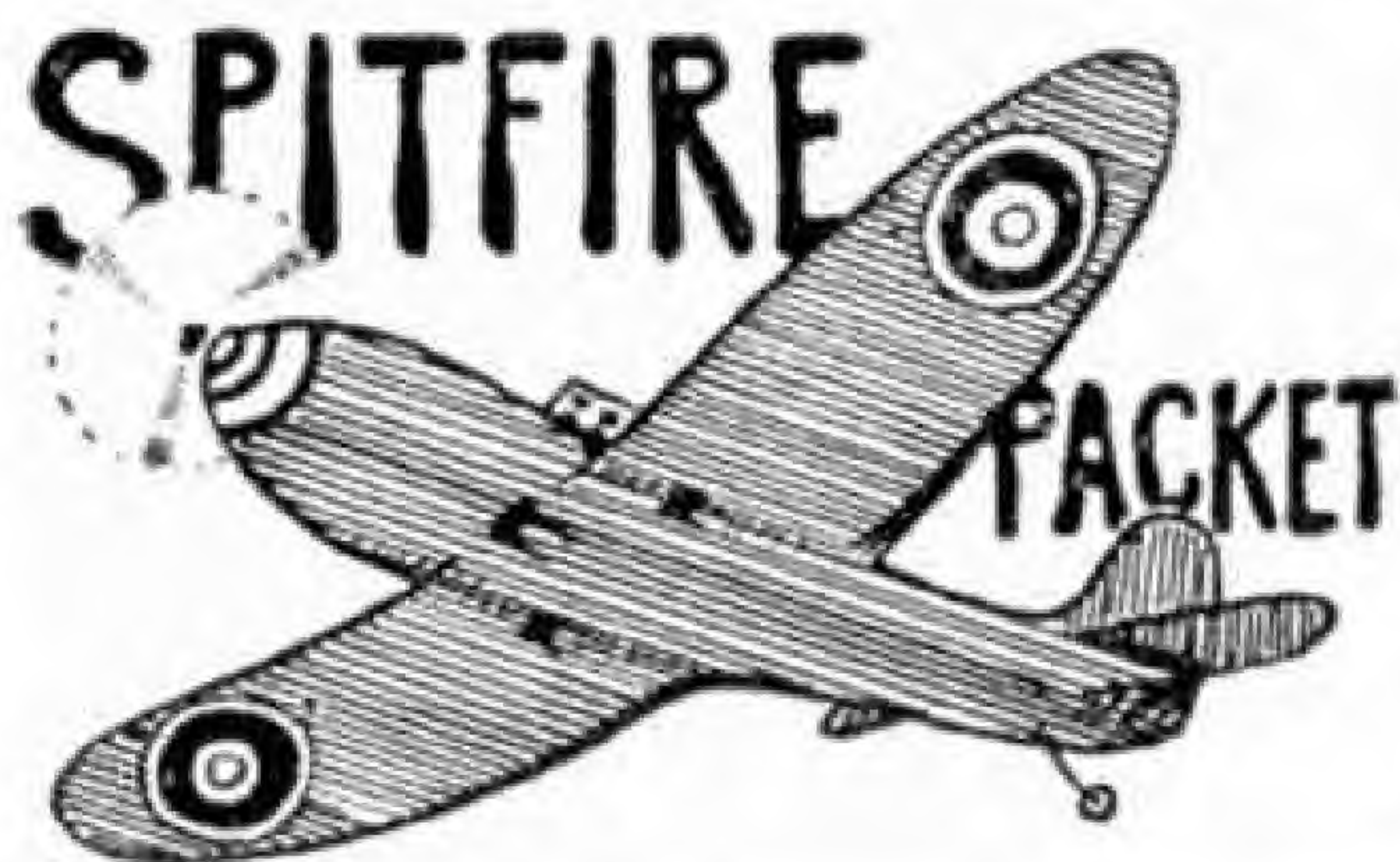
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FREE—POLISH FORCES



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G. P. KEEF
Willingdon, Eastbourne

For other Stamp Advertisements see pages 84 and x.

Stamp Collecting

Stamps of the Pacific War Zone

THE topic uppermost in all our thoughts to-day is the treacherous attack of the Japanese upon the United States Pacific bases, with the swift development of the war in that Zone, and collectors may obtain much interest by following the course of this new phase of the war with the aid of stamps.

First of all we need a map of the Pacific so that we may trace the principal incidents as they occur, and it is to Japan that we turn for this map. The 6 and 10 sen.



values of the 1927 issue commemorating the 50th anniversary of Japan's entry in the Univer-

sal Postal Union showed an excellent map of the whole of the Pacific. An ironical feature of the design is the dove of peace descending on Australia bearing a letter in its beak! The 6 sen value is illustrated on this page.

Another interesting Japanese map stamp design can be taken from the Second Census Commemorative issue of September 1930. This shows a map of the Japanese islands and the adjacent Kwan-tung Peninsula, leased to Japan by China after the Russo-Japanese war.

Both maps of course are small in scale, but they serve to outline the area of the Pacific zone of the war. Slightly larger maps of separate areas are available. For example, Australia and New Zealand have featured maps of their territories in stamps issued in 1913 and in 1923 and 1940 respectively. Australian air mail designs of 1931 and 1934 show the two hemispheres, and the 6d. value of the 1931 series is shown on this page.

The American Pacific coastline is excellently



shown in Canada's Imperial Penny Postage commemorative issue of December 1898. In a world map on this stamp British territories are marked red, and those in the Pacific can easily be picked out. Incidentally, a few moment's study of these maps enables one to appreciate the amazing scope of the Japanese ambition to conquer the whole of the Pacific.

Another useful map stamp is that issued in China in July 1939 to celebrate the 150th anniversary of the United States Constitution. This shows an excellent map of China, with portions of surrounding countries. The stamp is a large one, as the 5 c. value here reproduced in facsimile on page 85 shows, and the flags of China and the United States are reproduced in scarlet and blue.

The opening incidents of the war cannot be traced with stamps. There is no stamp design in United States or other issues featuring Pearl Harbour or Wake Island, but the fight for Manila can be represented by the 2p. value of the Philippine Islands issue of February 1935, in which an earlier Battle of Manila is depicted. This was the naval fight in Manila Bay between United States and Spanish Naval forces. The 10c. value of the same



issue shows Fort Santiago, one of the outposts of the Islands. A later issue in February 1937, commemorating the XXXIIIrd Eucharistic Congress, provided an excellent map of the islands of the Philippine group.

The Chinese war scene can be illustrated by the

(Continued on page 85)

A FEW ATTRACTIVE BARGAINS

Coronations complete 202 val., MINT 50/-, USED 60/-, with Album, MINT 55/-, USED 65/-; Crown Cols. 135 val., MINT 25/-, USED 30/-, Dominion MINT 27/6, USED 32/6; Coronations and Jubilees, single sets, ask for special list. Great Britain King George VI, 2/6, 5/-, 10/-, superfine copies 4/6; Morocco Edward VIII 11 val. MINT 1/-; Western Samoa 1939 Stephenson complete MINT 12/6; Zanzibar Jubilee complete MINT 2/-; Australia K.G. VI £1-USED 9/-; Ceylon Prov. 3c. on 6c. 6d.; Egypt Child Welfare 1940 7d.; 100 diff. Pictorials Whole World 4/3 per packet; Kenya Prov. MINT 3 val., in pairs 1/9 per set

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LEBANON" stamp, beautiful **FR. EQUATORIAL AFRICA**, Czecho-Slovakia, etc., etc., and, finally, as my extra **FEBRUARY GIFT**, I am including the very **BEAUTIFUL ICELAND STAMP** (illustrated) showing a swimming Codfish.

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For other Stamp Advertisements see pages 82 and x.

Stamp Collecting—(Continued from page 83)

view of the Ministry of Communications at Nanking, former capital of China, and General Chiang Kai-shek's original headquarters, that appears on the 100c. value of a 1936 issue celebrating the 40th anniversary of the establishment of China's postal services. Two views of Shanghai appear on other stamps in this issue, the Bund, or waterfront, on the 5c., and the General Post Office on the 25c.

The wealth of the Dutch Indies and the Malayan peninsula have been developed solely by the industry and capital of the white races. The rubber that the Japanese covet so dearly was introduced there by Britons, and the oil and tin are natural treasures that have been developed to the benefit of the territories by white industry. One wonders what would be the share of the



inhabitants under Japanese control. Unfortunately there are no stamps from any of these territories that represent these great industrial enterprises, although stamps from Malaya, Borneo, the Dutch Indies, Thailand (known in our albums as Siam), and French Indo-China have all given us interesting illustrations of local features. For instance, the 5c. Malayan stamp of the 1935-37 issue reproduced on page 83 shows the mosque at the Palace at Klang, while a Papuan stamp shown on the same page, the ½d. value of 1907-10, illustrates a quaint native boat.

For stamps more directly connected with the course of the war we turn to Hong Kong, now in Japanese hands after a heroic resistance. Views of this great commercial centre were shown on the centenary issue of 1941. Two of these are reproduced here. One gives a view of the harbour, and the other illustrates the University.

For the American side of the picture, there are several views of the Panama Canal on stamps. The best of all

is the picture, on the six values of the Canal Zone's air mail issue of November 1931, that shows the Pacific entrance to the Canal. The 40c. value is shown on this page, and other interesting views are to be found on the stamps of the 1918 issue of Panama. The Canal is destined to play an important part in the war, for this speedy link between the Pacific and Atlantic Oceans will be the means of enabling the full strength of the American and British Fleets to be brought to bear



where it is most needed from time to time.

Burma is now involved in operations, so the stamps in this country should be included in our collections. The first Burmese stamps of 1937 were overprinted Indian stamps. Distinctive designs were issued in November 1938, and among them were a picture of a royal Burmese barge and representations of the teak and rice industries.

We have by no means exhausted the list of stamps that might well be introduced into this story, and readers who feel disposed to follow the Pacific war with the aid of their stamp albums may be assured that they will find much to interest them in the task of obtaining completeness.



Stamp Gossip

and Notes on New Issues

The Free Polish Issue

Readers will be interested to see the accompanying illustrations of the Free Polish stamps to which we referred in the January "M.M." Those reproduced are as follows: 10 gr., ruins of the Finance Ministry at Warsaw; 55 gr., the Castle Square, Warsaw; 80 gr., a medium tank; and 1 zl. 50 gr., the Polish destroyer "Orzel."



Of those not illustrated here the 5 gr. and 25 gr. values show, respectively, the Germans wrecking the Mickiewicz Monument in Cracow and the ruins of the American Embassy in Warsaw. Mickiewicz was the national poet of Poland. The 75 gr. value pictures a machine gun nest, and the 1 zl. a British airfield with Polish-manned aircraft.

The Red Cross Stamp Auction

Philatelists made a great contribution to the work of the Red Cross through the medium of the second Red Cross Philatelic Auction, held in London on 31st December, and 1st and 3rd January. The "target" was £10,000, enough to maintain the Red Cross organisation for one day. Including cash donations, a total of £12,100 was raised.

Janet Gosnett, of Croydon, a nine-year old school-girl, caused the sensation of the sale by insisting on bidding on her own behalf for a collection consisting exclusively of stamps showing portraits of boys and girls in their designs. She stuck to her guns in face of some keen bidding from dealers and adult collectors, and finally emerged from the fray triumphant with a successful bid of £23.

An envelope addressed to King George VI at Hyde Park, New York, the residence of President Roosevelt, realised a total of £160 after being auctioned three times. The first airgraph letter, sent by General Sir Archibald Wavell to General Sir John Dill to inaugurate the service from the Middle East Forces, fetched £110, while a diary of 1840 kept by Mr. Edwin Hill, brother of Sir Rowland Hill, and containing many highly interesting references to the inauguration of the first postage stamp, Great Britain's famous "Penny Black," was sold for £300.

Stamps and the Nazis

The Nazi authorities have not been slow to recognise the cash value of stamps in their war effort. At every opportunity they have turned out new issues likely to interest collectors in the Reich and elsewhere, and provide funds to keep the war machine turning.

We learn from America that an attempt was made to market supplies of a stamp bearing portraits of King Haakon and Queen Maud that was on the point



of being issued in Norway when the Nazis seized that country. Supplies to a total value of a million dollars were already distributed to Post Offices throughout the country, but the sale was banned and stocks were impounded by the invaders. Shortly afterwards, parcels of the stamps commenced to arrive in the United States and dealers were invited to purchase supplies. It was found that the funds raised by the sale of these and other stamps were being used to pay printing bills for the Nazi propaganda machine.

Not all the Nazi stamp consignments sent to the States and other American countries have got through, and since the entry of Russia into the war, the flow has dwindled to a mere trickle. One parcel destined for South America was seized recently, and is to be auctioned in London this month. This lot includes quite

a large number of important rarities, all of them early issues from South American countries—and likely to command good prices. Other consignments are likely to find their way to London sale-rooms shortly.



A Unique Post Office

The recent death of the Earl of Leicester calls to mind the fact that what is probably the only remaining public post office in a private residence is maintained at Holkham Hall, the seat of his family. The Post Office at Buckingham Palace is not in this category, since it is not open to members of the public.

At Holkham Hall members of the public can purchase stamps and postal orders from a liveried servant of the Earl of Leicester, serving from behind a regulation Post Office counter.

A special cancellation stamp reading "Holkham, Wells, Norfolk" is employed. The neighbouring village post office uses "Holkham Village, Wells, Norfolk" to distinguish it from the office at the Hall.

The origin of this unique Post Office goes back to the early days of the 18th century, when an ancestor of the Earl shared the office of Postmaster-General and established a Post Office on his Holkham estate for the convenience of his tenants and staff. For many years mail coaches called twice daily.

We thank David Field Ltd., 7, Vigo St., London W.1, for their courtesy in loaning the stamps from which the illustrations for these pages have been made.



Copper—The Story of the Red Metal*(Continued from page 66)*

strength. Muntz metal, or yellow metal, contains 60 per cent. copper with 40 per cent. zinc. It is an excellent metal for hot working processes, such as forging, extrusion and die casting, but is not so useful for working in the cold as the alloys containing a greater proportion of copper. It is of great importance in Eastern countries for the production of various articles by hand fabrication.

The addition of lead to brass results in a great improvement in machining qualities, but there is a considerable loss of ductility.

Manganese bronze is a name given to a brass of nominal composition 60 per cent. copper and 40 per cent. zinc, containing manganese and tin or other elements for hardening and strengthening purposes. It is in fact a high-tensile brass.

Next Month: Uses in the Modern World.

WHAT IS AN OULACHON?

This fish with a strange name is found in Canadian waters of British Columbia, and it is sometimes called the candlefish because when it is dried it burns with a candle-like brilliance. It is being largely used nowadays for feeding animals on fur farms. This development has only arisen in the last two years, and the catch rose from 470 cwt. in the spring of 1939 to 1,900 cwt. during the 1940 season. Fur farmers now purchase all the candlefish available, placing them in cold storage in order to have supplies on hand throughout the year.

British Columbia is also one of the homes of another remarkable fish, the sturgeon, although eastern provinces account for most of the landings of this fish in Canada, where caviare, the famous delicacy always associated with Russia, is now made from the roes. The largest sturgeon captured in British Columbia in the last few years came from the Frazer River. It measured 11 ft. 2 in. and weighed 970 lb.

Still another interesting Canadian food fish is the swordfish, of which 23,000 cwt. was landed in 1940 from the waters around Nova Scotia. There is a mystery about the origin of these fish. The Strait of Messina between Sicily and the toe of Italy is known to be a breeding place, but Sicily is a long way from Canada and it is unlikely that fish from the Messina grounds travel so far away. Yet no other breeding ground of the swordfish has been traced.

Steel Castings—(Continued from page 52)

during the early stages of manufacture any casting that does not conform to specification. Finally a highly-skilled inspector stationed in the forwarding shop examines all castings before despatch to make sure that they conform in every respect with customers' requirements.

For readers who wish to obtain a more comprehensive account of steel founding we suggest *"The Manufacture of Steel—Simply Explained,"* by D. Edwin Gregory and Eric N. Simons, published by Pitman, which includes a chapter on the making of steel castings. We have drawn upon this book to some extent for our facts.

AN ATTRACTIVE RANGE OF SCALE MODEL LORRIES

The scale model vehicles produced by our advertiser D. Murray Wilson, Didcot, are for enthusiasts who prefer the cab-over-engine type. They comprise models in both the 4 mm. and 7 mm. scales, thus meeting the needs of both Gauge 0 and Gauge 00 model railway owners. They are remarkable for hitherto unattempted detail in design, the smaller type being complete even to the petrol tank filler cap, and their miniature scale rubber tyres have real moulded treads.

Over 20 distinct types of vehicles are available. The models for 1942 have the "Printastruct" cab, which is made from gleaming plastic material, process coloured, lined and lettered internally, with crystal clear windscreen, and side and rear view windows. Wilson lorries in kit form are available for those who



A "David Brown" tractor at work. Prize-winning photograph in the "David Brown" Photographic Competition No. 5. The next contest in the series is now open and details can be obtained from David Brown Tractors Ltd., Meltham, Nr. Huddersfield.

like to construct their own models. These are made with the same accuracy for detail as are the built-up models, and the "Printastruct" cab is included with all 1942 kits.

Wilson products are distributed in Great Britain by Bassett-Lowke Ltd., Northampton, and it is anticipated that the "Printastruct" cab will be available by the time this note appears. Details of all models and kits are given in an illustrated brochure, price 6d., which can be obtained on application to D. Murray Wilson, South Moreton, Didcot, Berks. The "M.M." should be mentioned when writing.

AEROPLANE PHOTOGRAPHS

We have received from our advertisers Real Photographs Company, Liverpool and Southport, their latest list, No. 13, of aeroplane photographs. This contains more than 1,500 titles of fighters and bombers, a large range of civilian aircraft, many 1914-18 war machines and aero engines. British aircraft and those of allied and enemy countries are included.

These photographs are now largely used for training purposes, and are suitable for instruction in the identification of aircraft. The price of the list is 4d., and a copy together with a specimen photograph will be sent to any reader of the "M.M." who sends 6d. in stamps to Real Photographs Company, Victoria House, Southport, Lancs. The "M.M." should be mentioned when writing.

Fireside Fun

RECOGNISED

A very plain bishop was visiting one of his rectors, who had a small daughter. When the little girl was brought into the room she sat down and stared at him. "Darling," said the mother, "go and shake hands." But the child went on staring, and then, as if recollection had come to her, she said suddenly: "I once gave you a bun at the Zoo."

Announcer (at a concert): "Miss Periwinkle will now sing. 'Oh, that I were a Dove, I'd flee.'"
Junior: "Dad, what's a dove-eyed flea?"

LONG WORDS

A rival to the celebrated Welsh tongue-twister Llanfair P.G., &c., is cited from Sweden. It is a word of 93 letters and can be easily pronounced by a Swede in one breath. Here it is: Sparvagsaktiebolagsskenskensmutsskjutarefackforeningspersonalbekladnadsmagasinsforradsforvaltaren.

It means: "The manager of the depot for the supply of uniforms to the personnel of the track cleaners' union of the street railway company."

Employer: "Surely, Miss Jenks, you know the King's English?"
Typist: "Of course he is. Whoever said he wasn't?"

"Your friend Joe seemed to be the life of the party."
"Yes, he was the only one who could talk louder than the radio."

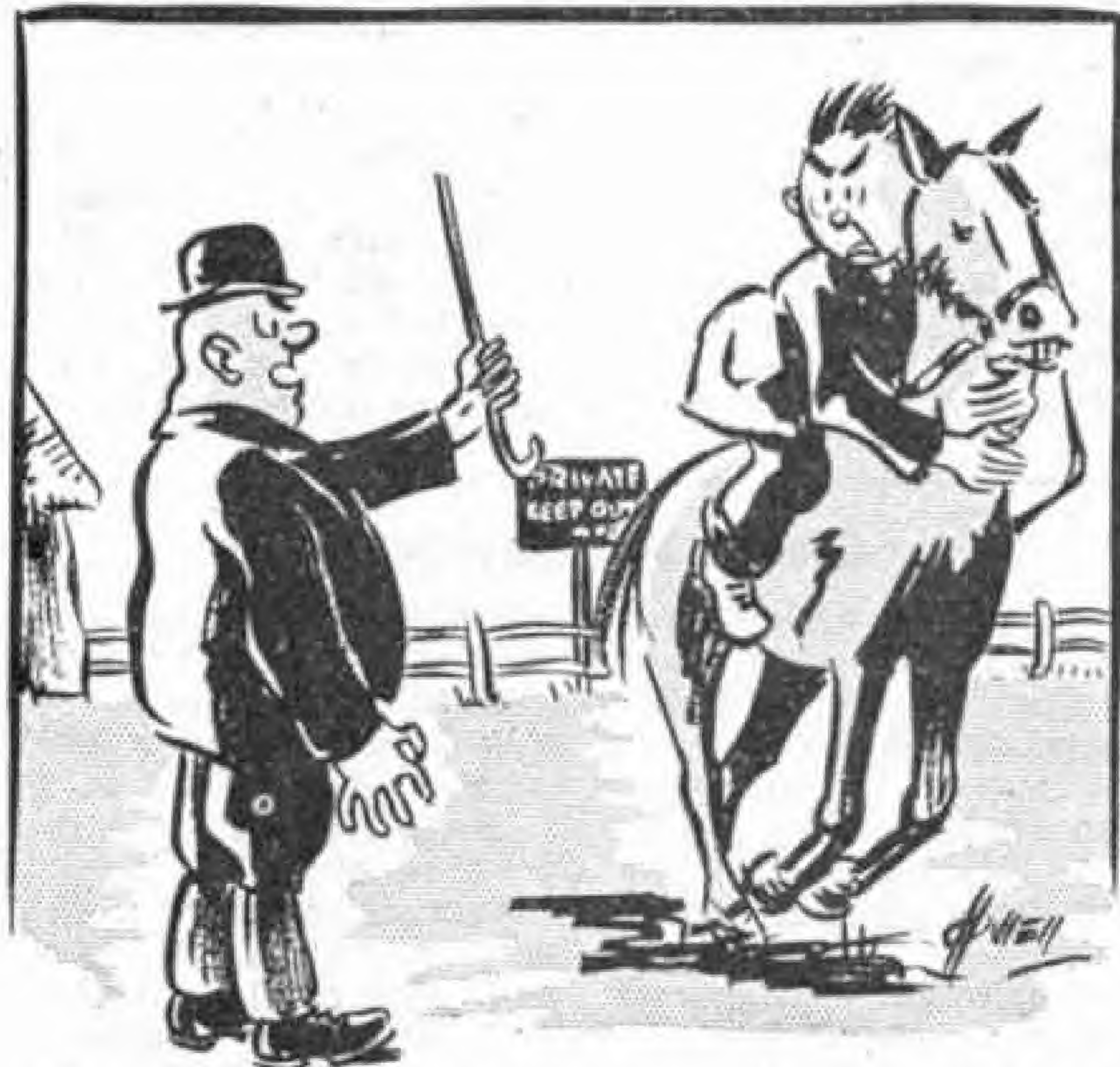
YOUR MORNING SMILE

Lady of the House: "Why, my good man, you have put that paper on the wall the wrong way. The pigeons are upside down."

Paperhanger: "Please, ma'm, they are 'tumblers'."

Guide: "This castle has stood for 600 years. Not a stone has been touched, nothing altered, nothing replaced."

Visitor: "Um, they must have the same landlord as we have."



Irate Farmer: "Hi! Can't you see that sign 'Private?' Why don't you keep off?"
Horseman: "Don't tell me, tell the horse!"

A CHANGE

Big Chief Sitting Bull and his squaw were feeling that they needed a holiday. But they couldn't think what to do, or where to go. At last the squaw had a brain wave. "Let's go camping this year," she said.

"Good-morning," said the customer. "Is the cashier in?"

"No," said the clerk. "He went away last night."

"Ah, for a rest, I suppose."

"No, to escape arrest!"



"No dear, it's too cold for one to-day!"

"Well, Mummy, can I if I put my coat on?"

"What I admired about the mounted police was the intelligent look on the horses' faces."

A VERY GOOD REASON

The guide did not know his job very well, but he did his best.

"Ladies and gentlemen," he informed his party, "on your right you see a monument erected last year to a noble cause."

"And what does it stand for?" asked one of the tourists.

The guide hesitated. "Why-er-because, madam," he said, "it would look so silly lying down."

"Lend me £5, I have left my pocket book at home."

"Here is twopence for a tram—go home and fetch it."

Her car stalled at the corner and the traffic light changed red, yellow, green; red, yellow, green, etc. The polite policeman stepped up beside her car and said: "What's the matter lady; haven't we got any colours you like?"

Bill (to mate, as they fall off scaffolding): "There's the dinner hooter, Joe. We'll be just in time."

POOR COMFORT

"Mr. Chairman," said an orator who was being severely heckled. "I must appeal on a point of order. I have been speaking now for over a quarter of an hour, but there are so many interruptions and so much ribaldry from all parts of the hall that I can scarcely hear myself speaking."

"Cheer up!" exclaimed someone. "You're not missing much."

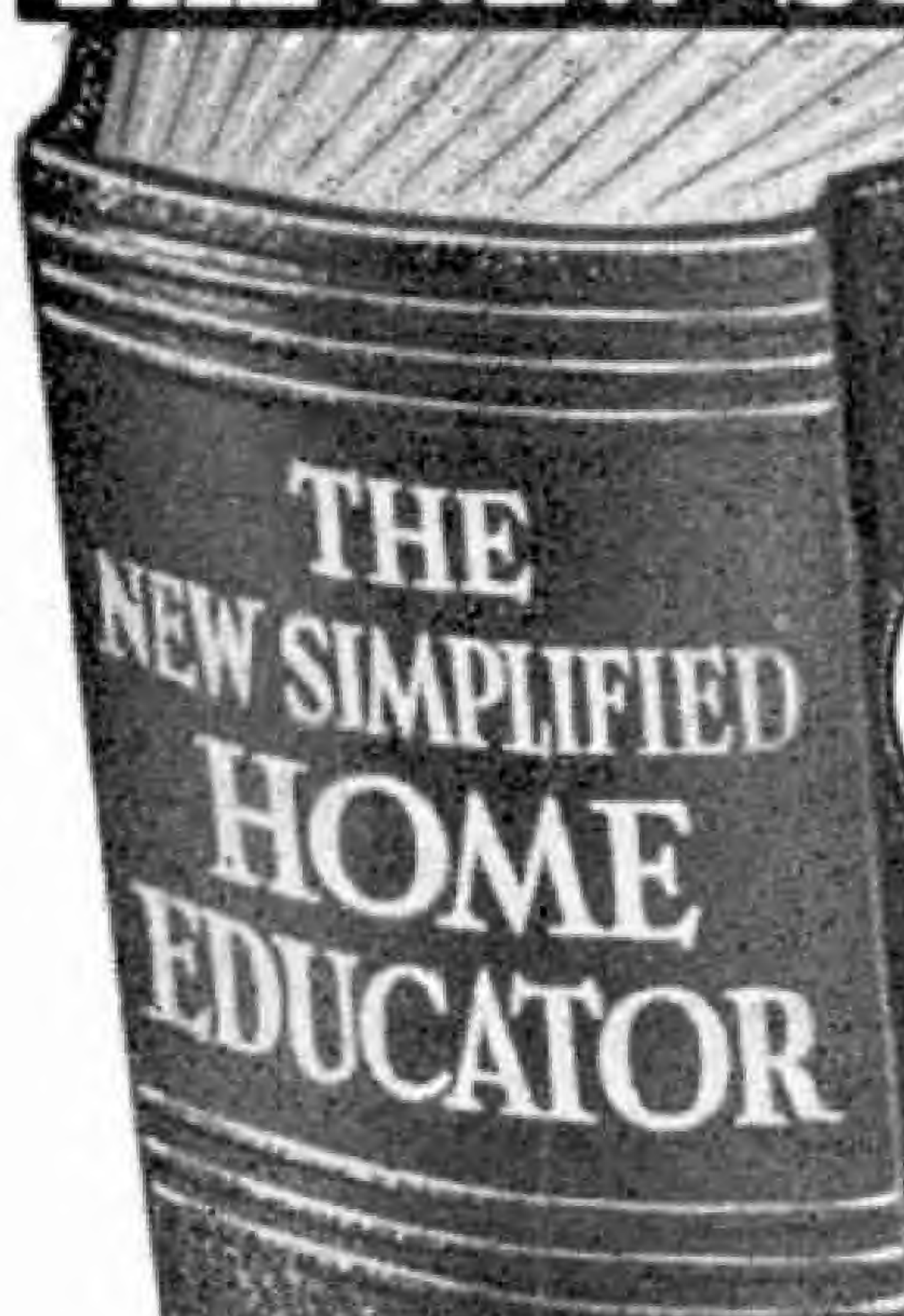
THIS MONTH'S HOWLER

The British Constitution is a sound one, but on account of its insolent position it suffers from fogs.

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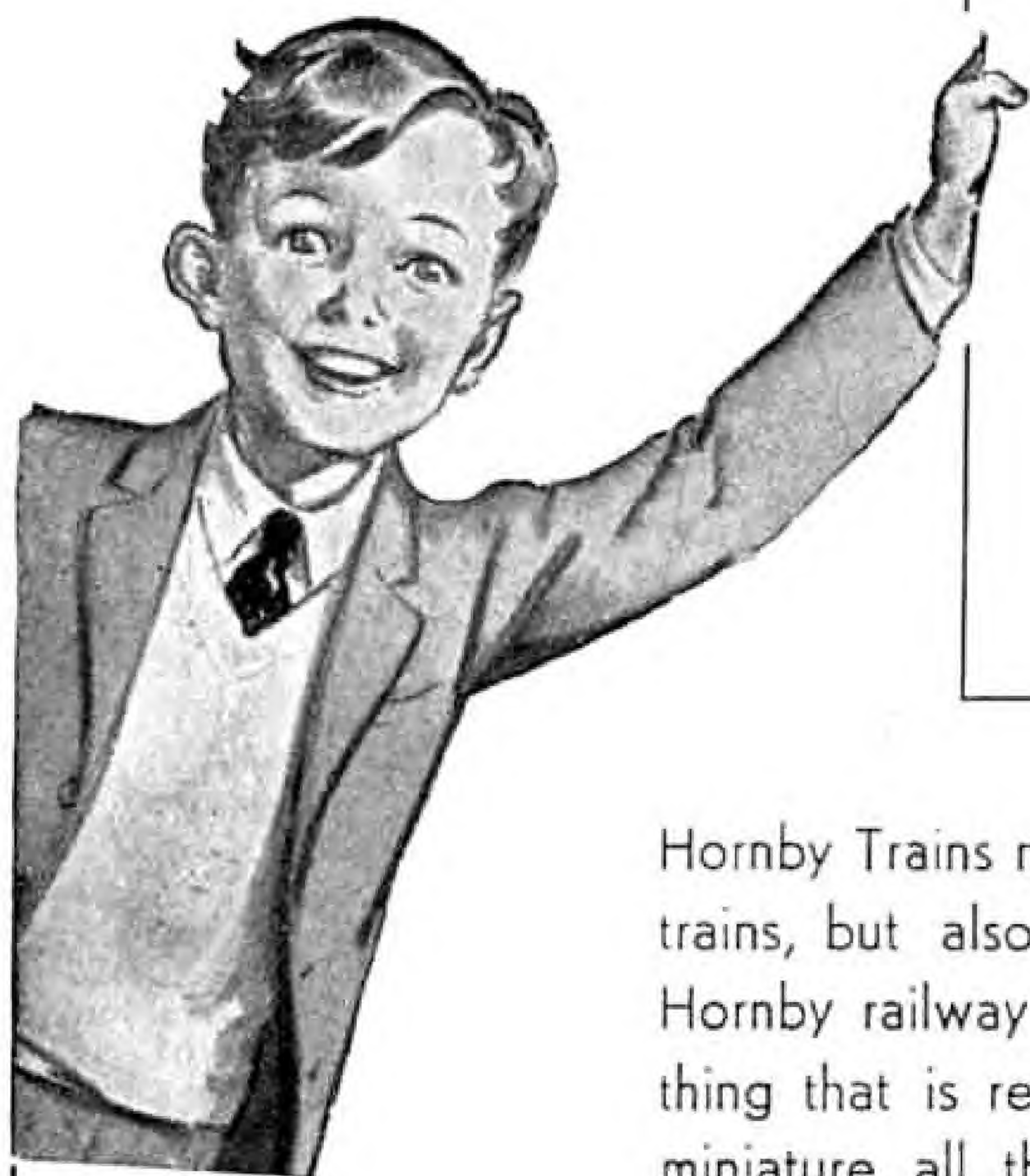
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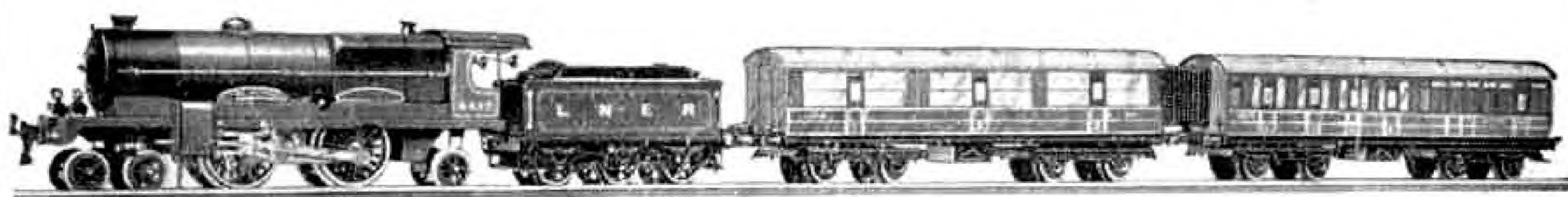


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